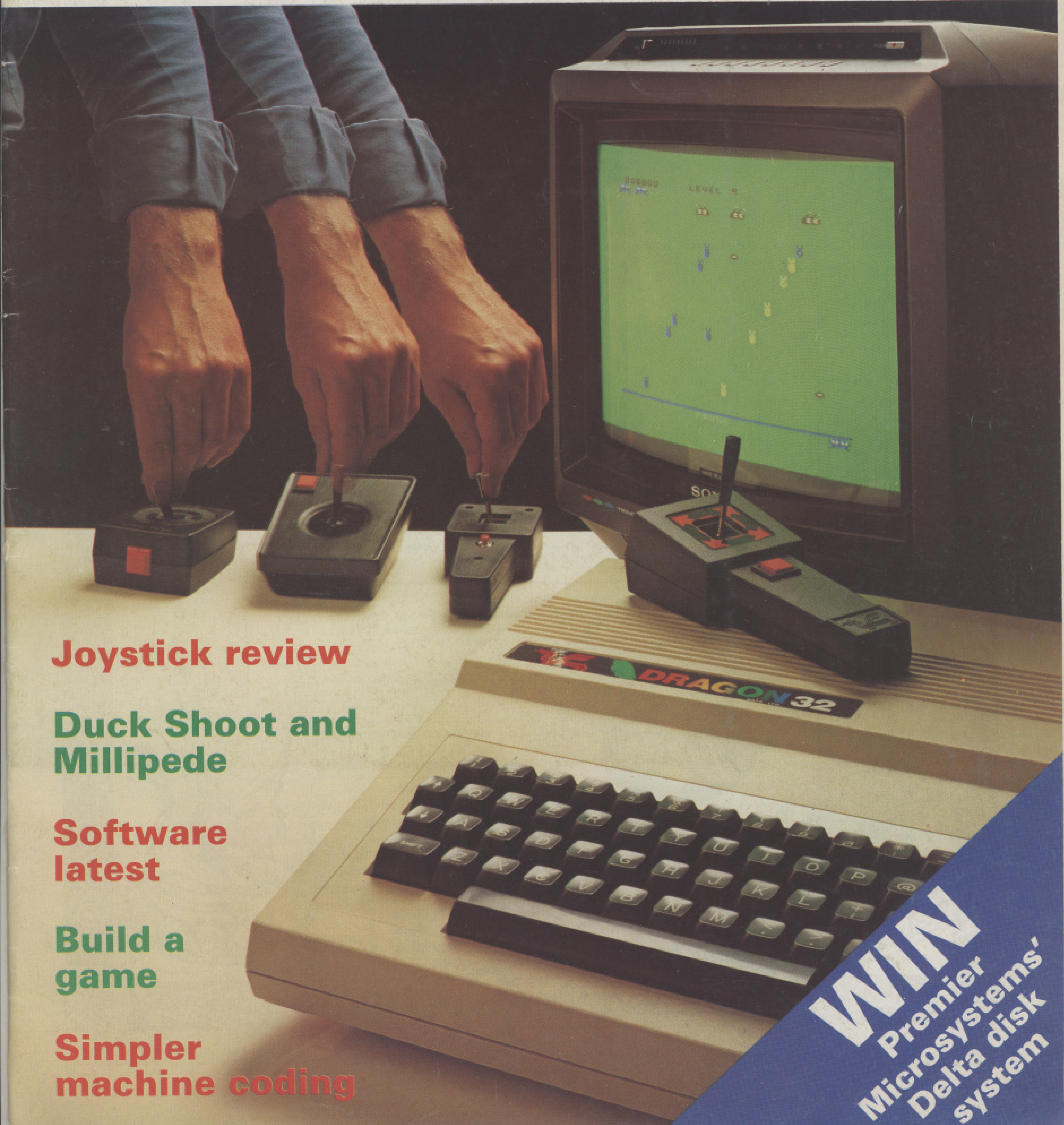
DRAGON USER

The independent Dragon magazine

60p $1·20 June 1983



Joystick review

Duck Shoot and Millipede

Software latest

Build a game

Simpler machine coding

WIN Premier Microsystems' Delta disk system


WINDOW ON ANOTHER WORLD
Cruise through the deepest reaches of space in a life or death struggle to decide the fate of the galaxy. Match wits with mighty mages in the final battle for supremacy of the planet Xarg. Test your driving skills on the tracks at Monte Carlo and Monza. Or just relax on a Sunday afternoon with a round or two at your local golf course.
Salamander Software offers a wide range of games for the Dragon 32, BBC Model B, Oric 1 and Tandy 32K microcomputers. Whatever your age, whatever your taste, Salamander Software has the program for you!
"Why can't all software come up to this standard?" – Computer and Video Games.
Price List: Dragon Trek £9.95. Wizard War £7.95. Golf £7.95. Grand Prix £7.95. Vulcan Noughts & Crosses £7.95. Games Compendium D1 £7.95. Salamander Graphics System £9.95. Super Skill Hangman £7.95. Star Jammer £7.95. Nightflight £7.95.
NOW AVAILABLE AT MAJOR BRANCHES
Boots
and
spectrum
Send SAE for full catalogue with details of new releases.
Cheques or postal orders payable to: SALAMANDER SOFTWARE, Dept. D, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL. Tel: 0273 771942.
Salamander Software

DRAGON USER

June 1983

Editor
GRAHAM CUNNINGHAM
(01-839 2449)

Software Editor
GRAHAM TAYLOR (01-839 2504)

Editorial Secretary
CAROLINE OWEN (01-930 3266)

Advertisement Manager
DAVID LAKE

Advertisement Executive
SIMON LANGSTON (01-930 3840)

Administration
THERESA LACY (01-930 3266)

Managing Editor
DUNCAN SCOT

Publishing Director
JENNY IRELAND

Dragon User, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.
Published by Sunshine Books, Scot Press Ltd.
Typesetting by Chesham Press, Chesham, Bucks. Printed by Eden Fisher (Southend) Ltd, Southend-on-Sea, Essex.
Distributed by S.M. Distribution, London SW9. 01-274 8611. Telex: 261643

Subscriptions
UK £8 for 12 issues
Overseas £14 for 12 issues

How to submit articles

The quality of the material we can publish in *Dragon User* each month will, to a very great extent, depend on the quality of the discoveries that you can make with your Dragon. The Dragon 32 computer was launched on to the market with a powerful version of Basic, but with very poor documentation.

Every one of us who uses a Dragon will be able to discover new tricks and quirks almost every day. To help other Dragon users keep up with the speed of the development each of us must assume that we made the discovery first — that means writing it down and passing it on to others.

Articles which are submitted to *Dragon User* for publication should not be more than 3000 words long. All submissions should by typed. Please leave wide margins and a double space between each line. Programs should, whenever possible, be computer printed on plain white paper and be accompanied by a tape of the program.

We cannot guarantee to return every submitted article or program, so please keep a copy. If you want to have your program returned you must include a stamped, addressed envelope.

We pay for articles according to the length and the quality — it is worth making that extra bit of effort.

Contents



Editorial

LESS THAN HALF WAY into the year and the predictions of the home computer industry and Chinese astrologers alike are already being revealed as accurate — the year of the Dragon is truly upon us. Not only is the Dragon 32 attacking new markets, in this case the US, but new machines are being lined up to attack different markets in the UK. Add-ons offering users increased performance have already arrived.

But these add-ons are beginning to change the nature of the beast in question. Joystick jockeys and Basic beginners may be wondering where Dragon Data is going and whether they will be left behind — not exactly alone, for there are more than 50,000 Dragon 32 users, but maybe a little isolated. The answer from the company is an emphatic no — and the same goes for this magazine.

However, Dragon Data's moves into new markets certainly present fresh challenges. It may be a cliché to warn that the US scene is highly competitive, but nonetheless it is a necessary observation. Atari, Texas Instruments, Commodore and Tandy (with its similar Colour Computer) will not yield easily to any UK invader. The business market in this country will be equally unbudging. In fact it can be argued that the year of the Dragon may turn out to be a make or break one for the company.

Dragon Data has already commented that the costings on the export drive have been worked out in fine detail, down to the third decimal place. When you're talking about US sales in the region of 200,000 those decimal points soon become very whole numbers.

But the selling prices of home computers can be very flexible. Smiths cut the prices on Sinclair machines at the end of last April. There are no prizes for guessing what the boards at Menzies announced not long after — you've guessed, price cuts. Similarly, price reductions in the US last Christmas saw various manufacturers playing their own particular game of tit for tat. Obviously such activities can play havoc with those decimal point calculations.

In the UK business market no one machine or manufacturer has established a strong position. The number of rivals may appear threatening, but a machine as soundly developed as the Dragon 32 is for its market would threaten in its turn.

The cost of developing new micros for these markets and then promoting them is high — but not as high as the rewards. The first half of this year, for all its activity, may look more like a lull by the time 1983 has come to an end.

COMPUSENSE

Software for Dragon 32

BARCLAYCARD VISA

PO BOX 169, PALMERS GREEN, LONDON N13 5XA
Telephone: 01-882 0681 (24 Hr) and 01-882 6936
Offices at 286D Green Lanes (9.45-6.00 Mon-Fri)

Access

HI-RES

upgrade to a 51 by 24 display **cartridge £25.30**

Just plug this cartridge into your DRAGON, switch on and you have a 51 column by 24 line display with true lowercase characters. This amazing software uses the high resolution mode to draw the characters on the screen and allows you to use BASIC almost as normal. In fact there are a number of extensions to BASIC to allow you to use the many additional features:

★ Mix graphics and text on the same screen
★ Select any of nine standard ASCII character sets for FRENCH, SPANISH, GERMAN, ITALIAN, BRITISH, USA, SWEDISH, DANISH or JAPANESE.
★ Redefine any of the 244 characters.
★ SPRITE GRAPHICS MODE enables any character to be an 8 by 8 dot Sprite.
★ A most responsive keyboard with AUTO-REPEAT.
★ Extra shift gives the missing characters on the DRAGON keyboard.
★ Leaves about 19,500 bytes for BASIC.
★ Switch between HI-RES and normal modes at any time.
★ BLACK on GREEN, BLACK on WHITE, GREEN on BLACK or WHITE on BLACK.
★ 32 by 16 compatibility mode for existing programs.

Hi-res is a must for serious programming.

DASM

an easy-to-use 6809 machine code assembler **cartridge £18.95**

★ Specially designed for convenient use on the DRAGON.
★ Does not use a separate editor.
★ Ideal for producing machine code routines to be called from BASIC.
★ Includes a 6809 Reference Card.

Type your assembler program just as you would a BASIC program and use BASIC to call DASM. When DASM has assembled your program it returns to BASIC where you can check for errors and execute the program immediately if required. The source program is saved and loaded using the normal CSAVE/CLOAD. The assembled program may be saved to tape using CSAVEM (this can easily be done automatically in BASIC when the assembly has finished).

DASM is a two-pass symbolic assembler which allows labels of any length (the first five characters and the last character are used). All the 6809 mnemonics and addressing modes are supported plus comprehensive assembler directives for defining constants, reserving memory, directing output to screen or printer. Errors detected by DASM are reported with easy to understand text messages.

DEMON

Machine Code MONITOR **cartridge £18.95**

DEMON gives you access to the inside of your computer. It features a real time display of memory locations in both hexadecimal and alphanumeric codes, a full screen editor for memory and register contents and multiple breakpoints. There are twelve commands designed to assist in debugging and running machine code programs (or BASIC programs with PEEK and POKE).
DEMON, unlike inferior products, has its own documented input and output routines which means that it does not interfere with BASIC. DEMON can be called from a BASIC program and will return control to the BASIC program. A user manual and a 6809 Reference Card are included.

DASM/DEMON

cartridge £30.45

Combines DEMON and DASM in one cartridge. The ideal combination for developing machine code programs on the DRAGON.

DECODE

BASIC Converter **cartridge £18.95**

DECODE converts BASIC programs between TANDY COLOR format and DRAGON 32 format. Simply CLOAD the "foreign" program from tape, EXEC the cartridge and the program is converted. The same cartridge will work on a DRAGON 32 and a TANDY COLOR (Extended BASIC).

GAMES ON CASSETTE

CC POKER £7.95

Join Rocky, Harry and Sam for a captivating game of 5-card Draw. Excellent graphics and sound effects. May turn you into a card sharp overnight. Five levels of difficulty.

SPACE RACE £7.95

A fast action arcade game with 16 levels of difficulty. Chase and destroy the marauding aliens. Use joysticks or keys. Includes a High Score league table.

C-TREK £7.95

An enjoyable and easy-to-play space adventure game with comprehensive instructions.

PIRATES AHOY £7.95

A humorous nautical adventure game. Solve the riddles and direct the pirate to the treasures.

DESERT GOLF £7.95

Play a round on the Nevada course. High-resolution display and good sound effects.

PLEASE ADD **50p** POSTAGE ON ORDERS FOR SINGLE CASSETTES

BOOKS NOW IN STOCK

35 Programs for the Dragon 32	£4.95
The Working Dragon 32	£5.95
Programming the 6809 (Zaks)	£12.50
Enter the Dragon	£5.95
Load And Go With Your Dragon	£5.50
The MC6809 Cookbook (Warren)	£6.25

Postage on books: add **50p** per book — maximum charge £1.00

We support our software!

Send SAE for details of our current upgrade details for cartridge software. This service is available direct from Compusense.

SEND LARGE SAE FOR OUR LATEST CATALOGUE

BY MAIL ORDER – OR ASK YOUR LOCAL DEALER

Copyright routine

WHILE PLAYING around with my Dragon 32 I came up with the following useful routine which is ideal to put a copyright on all programs written by us amateurs.

Type:
10 REM
20 REM

Next type:

EXEC (39512)

Then press ENTER (twice). Garbage is produced on the screen. LIST your program.

Next type directly:

'YOUR MESSAGE' = 39512 (in this case COPYRIGHT SHELDON SOFTWARE = 39512)

Then type:
EXEC COPYRIGHT SHELDON SOFTWARE (or 'YOUR MESSAGE') and type 'ENTER' twice.

You will now see that the message (in this case COPYRIGHT SHELDON SOFTWARE) is now at line 65535. This line cannot be edited or deleted and is hence a safe place to store your messages. You can now delete lines 10 and 20 and then type in your program.

*R Sheldon,
Compton,
Wolverhampton.*

Selected listing

LIKE ASHLEY Buss I have been less than happy with the way the Dragon lists programs.

But I wonder if he has realised that it is possible to list a selected portion. LIST 300-400 does just that and LIST -400 stops at 400.

One tip is to put just before a key section in a program one or two lines:

REM *************

This can easily be spotted even when a list is running through fast, in time to press BREAK and stop it.

One thing I tried was adding a short end-program to longer programs:

```
5000 STOP
5010 INPUT X
5020 LIST X to X+ 10
```

This should have given me a quick way of listing a segment, just by entering GOTO5000 and then the number of the section of the program I wished to list.

But for reasons I cannot fathom this just produces a syntax error. Does anyone know why, and if there is a way around the problem.

*Rodney Bennett,
London W10.*

Try the manual

I AM writing in reply to the letter from Ashley Buss on the subject of the Dragon's listing facility.

To halt a program listing all that is necessary is to enter [SHIFT]@, and to continue simply press any key. Did Mr Buss not read the (albeit abysmal) manual?

Finally, a word of warning: POKEing location 65495 with zero may seriously damage your processor's health.

*Glyn Heath,
Strelley,
Nottingham.*

Twice unlucky?

AFTER THREE months use my Dragon 32 suddenly dumped an hour's typing and either ignored commands, or gave S/N ERROR to everything. I have no complaint as it was immediately replaced by the dealer.

However, the other evening I loaded a program only to find chunks of it missing. Error messages were themselves erroneous and the Dragon started printing evenly spaced lines of graphic characters across the screen. I switched off, reloaded and had no further trouble.

I remember having similar problems with one of the early calculators that was simply caused by dust getting in the works. I could seal unused ports if this is the problem, or would you think that I have been unlucky a second time?

By the way, how many other Dragon owners have sussed that Doug Dixon's Peek and Poke routine (PCW 17-23 Feb) can be used to double-load a program thereby making up for the lack of a VERIFY command?

*D L George,
Shoreham-by-Sea,
West Sussex.*

Bridging the gap

THERE MUST be, by now, many users who have mastered the simple programming techniques and now want to know how the machine carries out the tasks we set.

It seems to me that there is a vast gap, for example, between those people, like myself, who know what PEEK and POKE are and do, and those who know what values to poke and where to poke them.

There seems to be no 'in-between-stage' info published.

I would like readers to consider the following program which, although simple enough in concept, raises many questions to we uninitiated:

```
10 FOR I = 32768 to 49151
20 A£ = CHR£(PEEK(I))
30 PRINT I; "............";
   A£
40 FOR J = 1 TO 200: NEXT J
50 NEXT I
60 END
```

From examination of the additional information booklet and its memory map this program prints out the section of the memory that contains the Basic interpreter, and it is very interesting to see the entire range of commands.

However, why is the last letter of each word represented by a low-resolution graphics character?

Also, I notice three commands not mentioned in any literature that I have read, namely LLIST, DLOAD and TAB with CHR£(168). As this character only appears this once I have no way of telling which letter it represents.

What are the uses of these commands (I assume that whatever the CHR£(168) represents, the TAB function will be the normal one)? And why are they not listed in the instruction book?

I hope my point is clear that understanding Basic is not the same thing as understanding computers.

*Frank Hart,
Moulton,
Northants.*

Test the leads

IN REPLY to P A Low's cry for help over the non-recording of programs from his Dragon perhaps the fault lies with neither the micro nor the cassette recorder but with the leads that connect them.

On opening up the jack plugs on the Dragon leads he may well find the wires have not been crimped onto the plugs, this has caused strain on the soldering which has broken.

*Roy D Cole,
Merry Hill,
Wolverhampton.*

Dipswitch changes

I HAVE owned a Dragon 32 since last September and have found it a useful micro.

Recently I bought a Seikosha GP100A printer. After I had interfaced the two together I found that the LLIST command (barely mentioned in the Dragon manual) did not work as each line overwrote the previous one. To overcome this the case had to be removed and dipswitch 3 had to be moved to the ON position.

Switches 1 and 2 can be altered if you require a £ sign. I hope this information may be useful to anybody who cannot get his Seikosha printer working.

*Andrew Pimperton,
Wyken,
Coventry.*

Software Top 10

1	**Donkey King**	Microdeal
2	**Katerpillar Attack**	Microdeal
3	**Planet Invasion**	Microdeal
4	**Space War**	Microdeal
5	**Dragon Trek**	Salamander
6	**Alcatraz II**	Microdeal
7	**Quest**	Dragon Data
8	**Wizard War**	*Salamander*
9	**Chess**	Dragon Data
10	**Madness and the Minotaur**	Dragon Data

Chart compiled by Boots

Try your chances as an author

IF YOU think you've designed a winning piece of software and you want to try to market it yourself, a company based in Hampshire may be able to help you.

Direct Media Facilities (DMF) has set up a copying service for authors and will design inlay cards for the cassettes. The company can also give some advice on marketing.

Mark Andrews, DMF's production control manager, said: "We'll deal with anyone who gives us a call."

To try and avoid any legal problems DMF is asking users of the service to sign a statement accepting responsibility for the copies produced.

DMF is based in Waterlooville in Hampshire — on (07014) 66337.

Games arrive at the Midland Fair

THE MIDLAND Computer Fair, held in Birmingham's Bingley Hall, saw an improving situation for Dragon users.

The fair, which was held over three days from April 28, had impressive displays from both Salamander and Microdeal — the two market leaders in independent Dragon software.

And other software houses traditionally associated with different micros have turned their attention to the Dragon — with both Quicksilva and Personal Software Services offering new games.

Salamander had two new programs at the exhibition — Starjammer, an arcade-style space-chase game, and an extended graphics system.

Salamander also announced that it will be selling its products in Boots — the retail chain — and in an interesting turnaround said that it will soon begin producing software for the Tandy Colour Computer. An initial order of Salamander software has already gone out to Boots.

Dragon Data goes on offensive

DRAGON DATA'S expansion plans are going ahead, with four new machines being lined-up to extend the company's range.

Dragon 32 owners can upgrade to 64K in the second half of May by changing boards at a cost of £75.

The 64K board will give users 48K of Ram, the rest going to Microsoft's Basic. However, Dragon Data will also be offering some languages on cassettes, Forth and possibly Logo, giving users the full 64K to play with.

For users wanting more memory the disk drive system, available at the same time, will give 250K unformatted in an entry level system costing £275.

The 64K board will also be used inside the Dragon 64 which will cost £250–£300 and have other extras such as RS232 interfaces.

The next machine in line will still be 6809-based, but with a more upmarket performance — monitor interfaces, improved graphics, plug-in expansion, etc. This is due in September, costing under £400, followed by a business micro next year.

By then the wheel will have turned more than full circle and Dragon Data is already considering a new machine to replace the 32.

Strike the right note

IT IS now possible to get better quality and more versatile sound from your Dragon using a Sound Extension Module from JCB Microsystems.

You can experiment with harmonies and produce three-note chords with one Music command.

The module also gives games players a range of pre-programmed sound effects. These include machine guns, falling bombs and the more gentle sound of birds.

The £34.95 module plugs into the cartridge port and has no extra wires or leads. JCB Microsystems is on (0202) 423973.

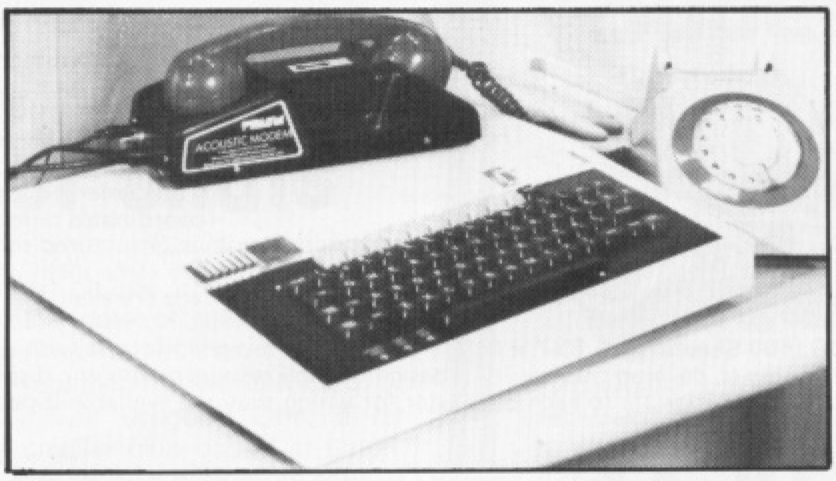
Telesoftware lined up for summer

INTERFACES LINKING Dragons to a service known as Micronet 800 will be ready late this summer, giving users telephone access to a range of free and discounted programs.

Micronet 800 also offers electronic mail and message handling facilities, computer news, and access to the more than 250,000 pages of information stored on the Prestel viewdata system.

The leads, hardware and software needed to link Dragons to Micronet 800 will be ready this September. They will be supplied as a networking interface package costing about £50.

Other costs will cover subscription to Micronet 800 at £32 a year, and to Prestel at a cost of about £20 a year.



Micronet 800 – Dragon interfaces are scheduled for late September

There is an additional charge for connections to the central computer between 8 am and 6 pm on weekdays, and up to 1 pm on Saturdays. Obviously you also have to pay for the telephone time you spend connected to the service.

In return, Dragon users will get access to free games and educational programs which they can download over the telephone. The service's organisers say that more than 100 such listings are available, constantly updated.

In addition you will be able to send messages to other Micronet 800 or Prestel users — straight from your keyboard. And messages for you will be held on an electronic mailbox.

These messages can only be accessed with your personal subscriber number which you receive with your interface package.

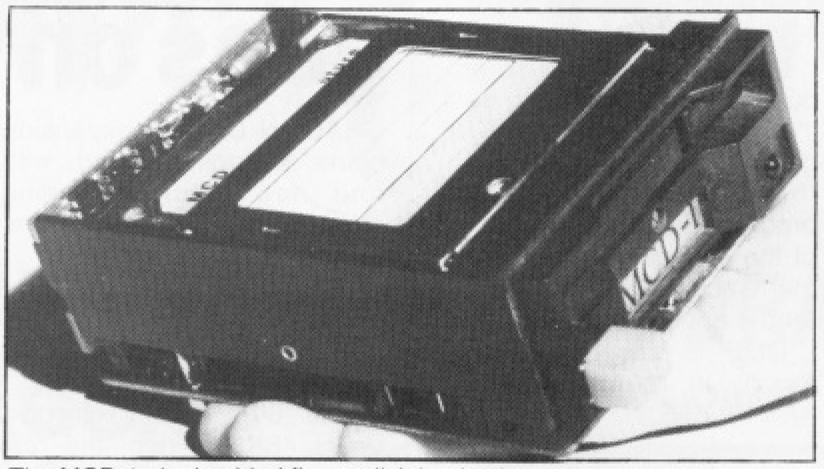
Micronet 800 was launched last March and aims to pick up 100,000 subscribers in its first three years of operation. Interfaces were available for BBC micros first, others have followed.

The service is a joint project of British Telecom, Telemap, ECC Publications and Prism Microproducts.

News Desk

01-839 2449

Disk market gets in gear



The MCD-1 single-sided floppy disk in plastic cassette

USERS WAITING for Dragon disk drive systems are going to have a wide range to choose from by the end of the summer.

In addition to Dragon Data's own models, drives will be available from Microprocessor Engineering (MEL) of Southampton and from the Spectrum dealer chain.

Croydon-based Premier Microsystems already has two systems available, with more to follow.

MEL's entry-level system consists of one drive, a power supply unit, controller and interface — for about £275. The disk is the smallest of the microfloppies on the market, the 3 inch MCD-1 developed in Hungary.

But MEL's Stephen Pelc pointed out that the chip in the disk controller is capable of handling up to four disk drives of any size — 3, 5¼ or 8 inches. MEL therefore plans to add other packages to the range, called Jet-Disc.

Neither MEL nor Premier is worried about Dragon Data's disks. As Pelc says: "If independents waited to see what manufacturers did we'd never do anything."

And Peter Rihan added: "The market is more than large enough for all of us."

Premier's first two systems, Deltas 1 and 2, come with a controller cartridge, cable and 5¼ inch Canon disk drive.

The entry-level system, with a 40-track, single-sided disk offering 100K of storage, costs £299.95. Delta 2 doubles the storage.

Spectrum, on the other hand, is waiting to see what Dragon Data does before introducing its Viscount systems. The first will be 5¼ inch models costing about £275.

Modem on its way from Cotswold

A THREE-MAN firm in the Cotswolds is opening a wider world of communications to Dragon users by introducing two standard interfaces for the machine as well as a modem.

From June, Cotswold Computers will be selling RS232 interfaces linking Dragons to a range of peripherals such as disk drives and printers. This will cost about £50.

A modem, also available this summer, will allow Dragons to talk to each other over the phone, so that small communications networks can be set up.

By the end of the year, the firm will also be selling an IEEE interface, extending the range of options for users even further.

Cotswold Computers can be reached on (0608) 737472.

News Desk

01-839 2449



John Symes: "It won't cause us too many headaches"

Changes forced on Donkey King

MICRODEAL HAS withdrawn its highly successful game for the Dragon 32 — Donkey King.

This move follows a statement from Computer Games that it considered the name an infringement of its copyright on the title Donkey Kong.

Microdeal has agreed to alter the game which has been extensively advertised in the computer press. Microdeal, managing director John Symes said: "If they have trade-marked it, then fair enough, we are happy to comply.

"Actually it won't cause us too many headaches, we were going to replace it anyway. Now we will call it The King."

Champions comes up a winner

SOFTWARE HOUSE Peaksoft adapted its Champions football package to predict the winner of an important non-leage game — and both the firm and the local team emerged triumphant.

The adapted version was run on a Dragon and predicted that the local team, Burton Albion, would win 3-2.

Albion did win by one goal, but the final score was 2-1. The package was also nearly right about the time of the winning goal which came in the 84th minute — just two minutes later than predicted. Two of Albion's three scorers were also correctly forecast.

Champions sells for £6.95 for the Dragon and Peaksoft can be contacted on (0283) 44904.

One club opens as another shuts

ONE DRAGON club has opened as another closes its doors to new members — Dragon Data has finally put its club into operation while the Dragon's Den starts to shut.

Users, who have been sending off their Dragon guarantee cards since last August, should by now have received the first issue of Dragon Data's *Stop Press*.

This promises that "details of how to apply for membership of the Dragon Users' Club will appear in the next edition of the newsletter". Subscription for the first year will be free, commencing from the date of release of *Stop Press* rather than the date of returning the warranty card.

The Dragon's Den, a far smaller club based in Luton, no longer wishes to attract new members. The group's organiser promises that he will honour existing agreements but does not want more people to join.

He puts this down to "competition from other user groups and commercially-backed Dragon clubs".

Dungeon opens its cellar doors

The biggest Dragon users' club so far has its centre at Ashbourne – we went to talk to the Dungeon Master.

INTRODUCING THE DUNGEON Master and featuring a cast of 2,400, we bring you the Dragon Club at the Dungeon. Or rather Peter Woods, the Dungeon Master in question, brings you the club — for he is the organiser of the largest Dragon users' club so far, with 30 new members joining every day.

Membership of the club costs £6.00 a year, or £3.25 for a six-month trial. Overseas rates are slightly higher (£8.00 and £4.25), but this has not stopped members joining from outside the UK — from Scandinavia, Germany, France, Spain and as far afield as the Arabian Gulf and Zambia. As Peter says: "The Dragon has spread its scaly wings."

UK members range from the outer Orkneys in Scotland down to Jersey in the English Channel.

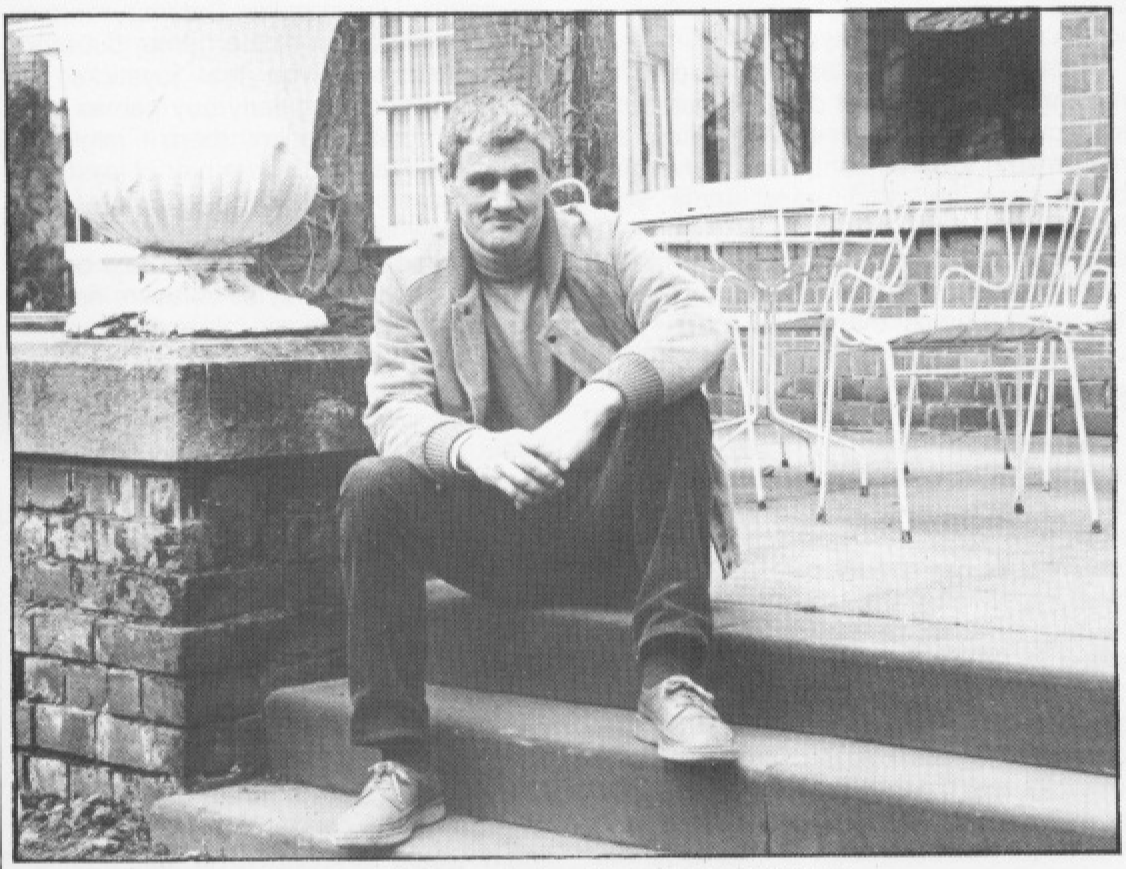
From fishing . . .

Peter is a former high-flying marketing man who has come to rest at Ashbourne in Derbyshire. When he decided to end his corporate career he moved into the fishing tackle business with two partners. He had already come into contact with computers when his marketing work took him to California's Silicon Valley. Computerising his new business's accounts increased his interest.

Peter explained that one of the problems with selling fishing tackle is that demand is season, with a lull at the beginning of each year. Moving into the home computer business — with high post-Christmas sales of software and add-ons — seemed an ideal way of filling this lull and combining business with pleasure.

The quality of the Dragon, and of the financial backing Dragon Data raised to go independent last year, made Peter's mind up — hence the Dragon Dungeon, the trading branch of the business. But Peter is more than a businessman, he is an enthusiast — hence the Dragon Club. Now he devotes nearly all of his time to the Dragon while his partners look after the fishing tackle trade.

The Dragon Dungeon's business revolves around the Dragon — it sells a wide range of software and add-ons. The latest catalogue from the firm describes more than 80 games packages, in addition to educational and business programs, and more than 10 utilities, including Automata's Dragon Doodles and Demos, Compusense's Decode cartridge and Dragon Forth from Oasis.



Peter Woods – whose Dungeon Club spreads from Scandinavia to Zambia

Peter emphasises that the Dragon Club is not a marketing outlet for the Dragon Dungeon. Members of the club receive a monthly newsletter called *Dragon's Teeth*. In this Peter promises: "We'll try to keep the reviews and articles free from commercial bias. The Dungeon may indeed stock the program, but if you think it's lousy, then say so. If you don't agree with the reviewer, then write in and say so."

Peter wants members to take over the club and the magazine, with the Dungeon acting as a co-ordinating centre. Dragon Dungeon is moving into new premises and Peter plans to leave one room free for whatever members suggest the club should be doing. As he says: "We want to hear from you." Suitably enough, the club room will be in the cellars of the new building.

. . . to feedback

Peter is already getting feedback from members as *Dragon's Teeth* shows. The range of members' programming tips, questions and answers is solid if not surprising. The flavour of the club is conveyed more by a tongue-in-cheek plea from one lonely heart, a request for help for a handicapped Dragon user, and a free advertisement for a smaller user group looking for members.

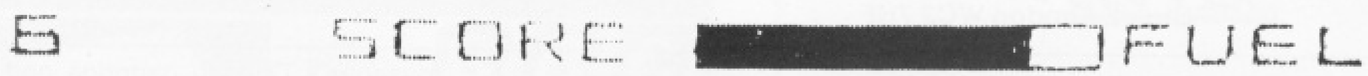
A lot of Peter's satisfaction comes from detecting and fostering this spirit of camaraderie. But he does warn that the Dragon market is becoming big enough to attract fly-by-night businessmen — so beware.

And he also has some words of advice against copying programs: "Most of the chaps who wrote that software you've just forked out a fiver for sweated long hours over the keyboard. Their return is normally a royalty on the number of tapes sold. If we want to have a steady supply of new, ever-improving software we've got to look after the writers."

But mostly the Dungeon is not a gloomy place. Members are already taking over the magazine, contributing reviews as well as tips, and qualifying for a range of special offers, club badges and club T-shirts. If you're feeling particularly extrovert, you can even order a bomber jacket to let the world know that you are a Dragon owner.

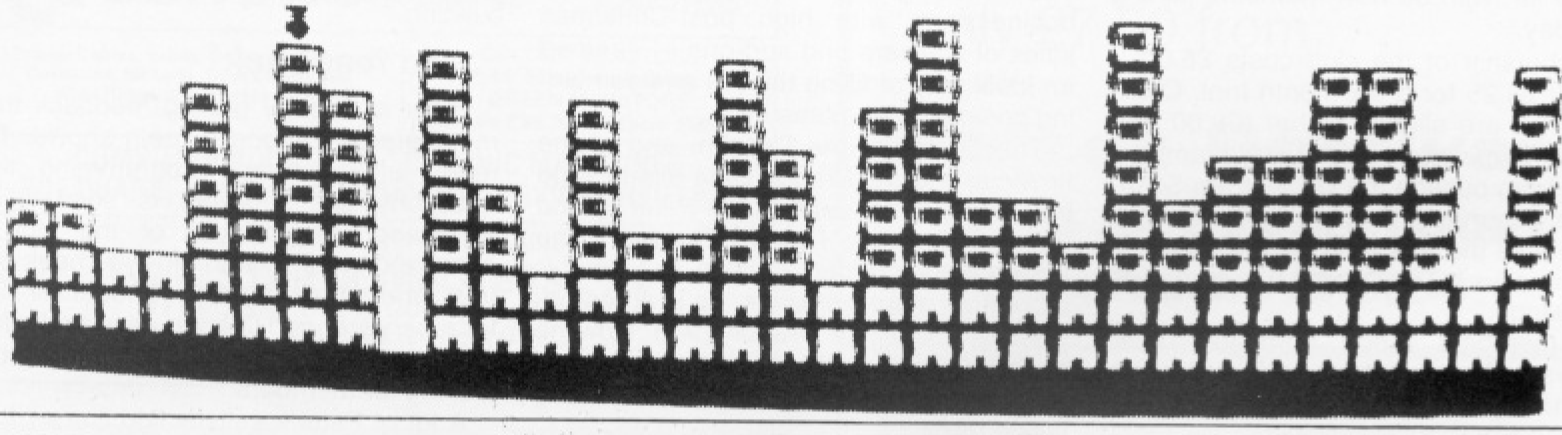
Peter admits that he does expect his business to profit from the activities and reputation of the club. But in any rivalry between his business ambitions and his enthusiasm for the club, neither is the loser — instead it is his sleep that suffers. Your Dungeon Master often gets less than five hours of rest a night. Maybe the dim light in the dungeon is some kind of substitute for sleep.

Peter can be contacted at the Dragon Dungeon, PO Box 4, Ashbourne, Derbyshire DE6 1AQ — or telephone (0335) 44626.



Alien go home

***John Scriven** tests his hand-eye co-ordination on some arcade-type action games – and finds some winners.*



THIS BATCH OF recent software for the Dragon shows considerable variation, both in content and in quality. Many new software houses are advertising each month, and with such variety it is sometimes difficult to see the wood for the trees. Games can often be divided into two camps: 'skill' games that involve fast hand-eye co-ordination, and 'brain' games that involve careful, logical thought — although better games certainly involve both types of ability. This month I shall be looking at the first category which includes mainly arcade-type action games.

Alien Blitz from Gem Software, at £7.95, is a version of City Bomber. The game involves bombing a city of sky-scrapers until you have enough room to land your craft. All the while, your fuel stocks are being depleted. When I loaded this program, I felt rather dubious about such a dated idea — it is not, after all, a difficult game to write, and listings have been published in magazines for some time now. This version is competent enough, and employs good graphics and sound. It also gives you the chance to climb higher or lower (in most versions you are forced to sink lower each time you cross the screen). It is a reasonable game to play the first few times, but soon becomes tiring. Although you may get some fun out of this cassette, it is rather overpriced for the type of game it is.

There are two versions of Missile Command on offer: Missile Defender from Tiger Software and Defense from Microdeal. Before the days of 'pretty picture' arcade games like Donkey Kong, my favourite way of wasting 10p was on Missile Command. The arcade version puts you in charge of three bases protecting cities dotted across the bottom of the screen. As the game starts, alien missiles fall from the top of the screen towards the cities. As they get lower, they split into baby rockets which are just as deadly.

Your defence missiles are directed by moving a cross on the display; instead of joysticks, the arcade version uses the rather neat idea of controlling movement by a large ball- that spins under your fingers. As each screenful of nasties is successfully destroyed, another faster, more unpleasant wave descends, containing smart bombs that home in on your cities with unerring accuracy.

Smooth ride

How well do these two Dragon versions approach the graphics and speed of the original? Missile Defender is a little on the slow side, and the graphics are rather 'chunky'. If I had not seen Defense, I would have said Missile Defender was fair value for money at £5.75; however, if you can afford £8.00, then the Microdeal version is considerably more professional. The graphics are more detailed, and as the program is written in machine code, the joysticks feel smoother and more responsive. As with many of its programs, Microdeal has obtained the licence to sell an American game originally written for the Tandy Color Computer. The title frame of this game shows that it comes from 'Colourful Software', and is well worth the extra £2.25.

These two cassettes also demonstrate an important point about program information. Missile Defender contains nothing on the cassette sleeve apart from the title and the name of the supplier. Defense contains a brief description of the game, but more importantly tells you that joysticks are required. If you regularly buy games software for your Dragon, then it might be assumed that you have a pair of joysticks, but it must be frustrating to arrive home with a new tape, only to discover that you have to spend the best part of £20 before you can play it. If only all software houses would supply this basic information.

Meteor Run and Breakout are on opposite sides of one cassette — Arcade Action from Apex Trading. The games are very basic, and some children who played them compared them to old ZX81 listings — not, I feel, intended as a compliment! The cassette is, of course, only £3.95, which is not an awful lot; however, for a little more, you could buy a really exciting tape.

Space Mission from Gemsoft starts off in an exciting manner. After the introduction, a space vehicle appears on the launch pad, and there is a very nice piece of graphics as it lifts off and goes into orbit. This is when the game itself starts, and you realise, as cosmic rocks come tumbling towards you, that it is just another version of Asteroids. You can rotate your

ship to the left or right and fire at them. After they are destroyed, a wave of alien craft attacks you. This sequence is repeated until you are too badly damaged to continue. At this point, you return to the earth in a similar manner to the launch and you are given a grading according to how well you have performed.

The first few times I played this game, I was impressed by the introductory and finishing sections, but as they are not really part of the game, they become irritating and it would be nice to jump straight into the action. The active part of the game is of a reasonable standard, but it is not difficult to discover strategies to ensure a good score, and I feel that arcade experts would find it lacking in real challenge.

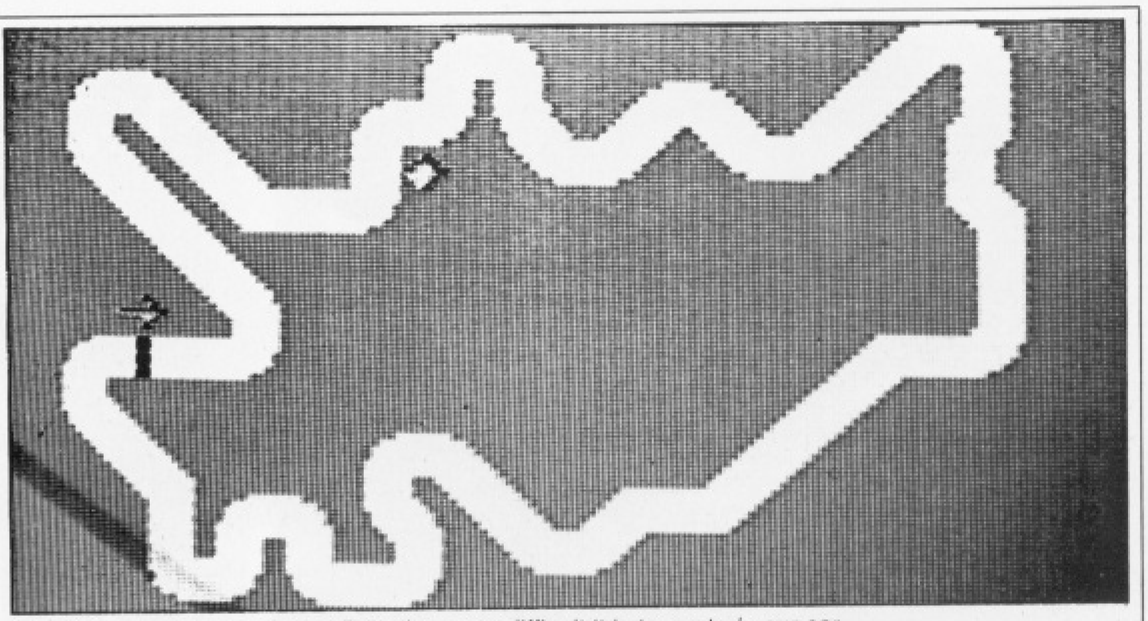
Packaging

Although you certainly can't tell a book from its cover, in the realm of computer software it is usually true that nicely presented cassettes containing good documentation show the same amount of thought when it comes to the program itself. For me, a good tape should contain instructions in the packaging as well as in the program. The latter should be optional viewing each time, to prevent boredom, but there's nothing worse than trying to absorb complicated instructions from the screen, only to discover that you've forgotten something vital at the beginning and have to run the program again.

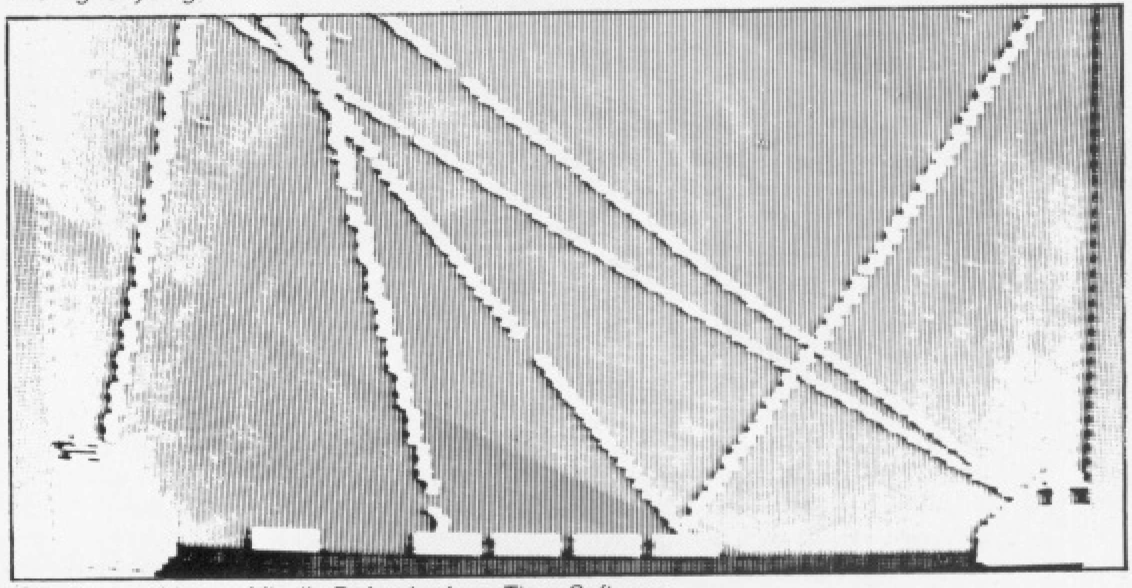
Salamander Software usually manages to produce interesting games and its cassettes are always neatly packaged in mini video covers containing a game description as well as detailed instructions. Grand Prix is no exception to this, and the documentation also reminds you of the by now fairly well-known POKE 65495,0 to speed up Basic programs.

The game starts with the opportunity to choose one of eight motor racing circuits from around the world including Indianapolis and Brands Hatch and you can select the number of laps you wish to race. Either one or two players are allowed, and movement is controlled by the use of joysticks. The fire button combines the functions of brake and accelerator. When you are ready to begin, the selected track appears, with the cars shown as coloured dots. At easy levels of difficulty there are few problems, but the higher you go, the more difficult it is to stop your car from colliding with other vehicles or from spinning off after passing over patches of oil. When this happens (rather too frequently in my case!), the screen flashes and in most cases, the race is over for you. I found this game entertaining, and although not my favourite, it should appeal to any budding champions with £7.95 in their pockets.

Monster Mine, another game from Gem Software, demonstrates the improvement in speed that is achieved in a machine code program. The object is to get a little figure from the bottom level of a mine to the surface while collecting as much gold as possible. This task is made more difficult (I almost said impossible, but I am assured it can be done) by monsters who tear along each level.



The higher you go on Grand Prix, the more difficult it is to control your car



Chunky graphics on Missile Defender from Tiger Software

Some of you may like the facility to enter your name in arcade games, but be warned: in Monster Mine, some unkind personal messages are flashed on the screen as you fail for the umpteenth time! The shafts to the next level are positioned at random along the passages, making this a challenging game, that needs careful planning before you make your dash for freedom from the safety of the bottom level. You are allowed the luxury of a panic button, but it can be used only once a game. This is an original variation on maze chase programs and is one of the best from Gem, well worth the £7.95.

With all the versions of Invaders and Space Wars on the market, it is a pleasure playing a game that shows a spark of originality, even it it has limitations. Such a game is St George and the Dragon from Computer Rentals. Although it may appear to be an adventure game, it actually involves steering the hapless saint across the screen, with either joysticks or cursor control keys. Both were rather difficult, especially as there are little things like slippery bridges and fire-breathing dragons to impede your progress. I soon discovered the impossibility of swimming in a heavy suit of armour, and it was some time before I came close to rescuing the damsel in distress.

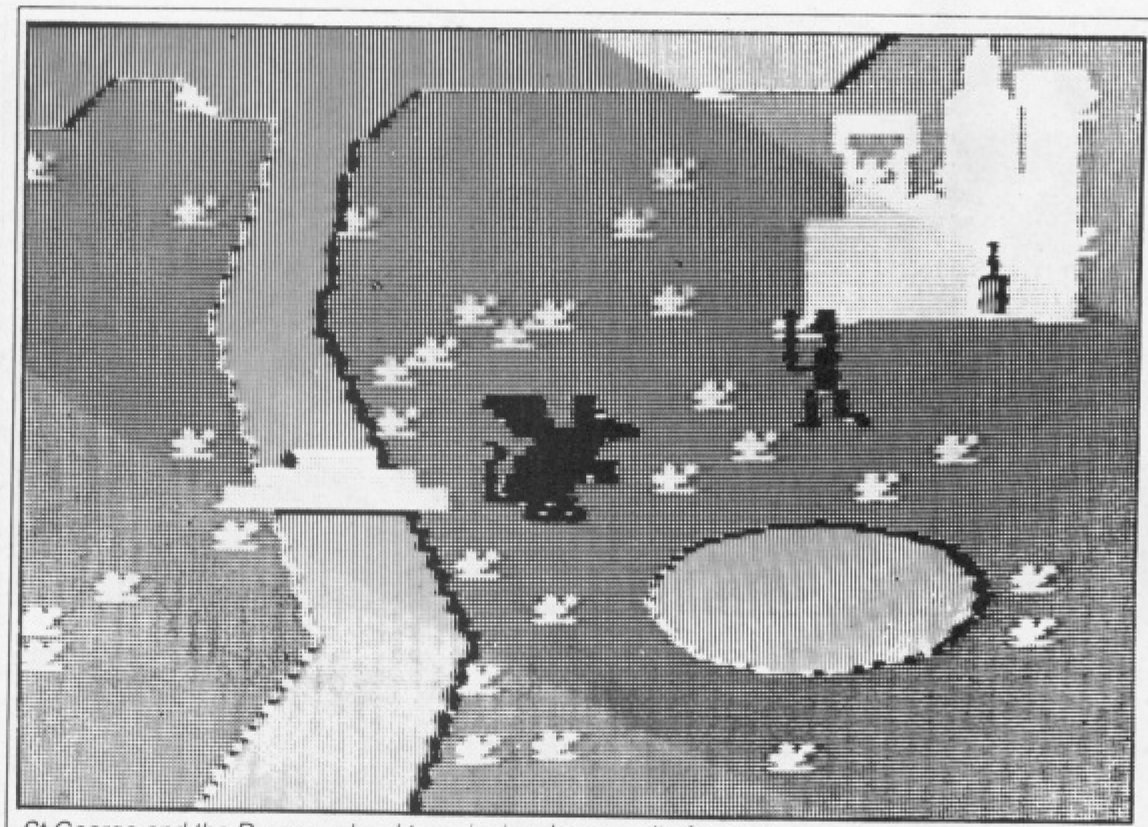
To keep you amused, there are musical interludes as you sink beneath the water or impersonate a piece of burnt toast. Instead of a skill rating, at the end you get to see how far up the Saints' league you reached. Although it is not the smoothest game ever written for the Dragon, it is worth the £6.95 to fall about in helpless laughter watching some other idiot make a worse mess of it than yourself (perhaps that's not a saintly thing to say).

Exceptions

Although it is often the case that compendiums of games combine short programs that the writers don't have the nerve to sell individually, there are exceptions. One of these is Gamestape 1 from B & H Software, containing four games, Lunar Lander, Jackpot, Blackjack and Horse Racing.

Jackpot is a fruit machine program that uses large graphics to show the spinning wheels. I don't really see the point of programs like this, as it's hardly competitive, and involves no skill to play. The only advantage is that although you can't win anything, you also can't lose real money when you play. This game is the weak point on the cassette, and Blackjack is only marginally better, although the graphics are well-conceived. While not wishing to encourage readers to blow their pocket money or house-keeping allowance on the real thing, these gambling games do seem to have their limitations, and I always have a sneaking suspicion that the computer cheats!

I have left the other two programs on the cassette to last as they really are the ▶



St George and the Dragon – hard to swim in a heavy suit of armour

◀ cherries in the pudding. Horse Racing resembles other versions in that players select horses from a field of runners, which then race across the screen to the finishing post. There all similarity ends. In this game you are presented with a race-card giving full information on the previous performances of each horse, weight, starting price, etc. All in all, a much closer simulation to the real thing. There are options that allow you to put money on to win, to have an each way bet, or to make a forecast. Starting with a limited amount of capital, the object is to make your first million in four days' racing. Not content with a full game like this, the actual race uses excellent graphics — no chunky blocks that look like Scottie dogs!

A real test

The last game, Lunar Lander, is the best version I have seen for the Dragon, and although the compendium price is rather high at £10.00, it would be almost worth it for this fine simulation alone. At the start, you are shown a general view of the surface of the moon. You have to successfully land three ships on small bases at a suitably slow rate of descent. As you approach the surface, the screen display changes to a detailed view and the landing platforms are clearly marked. Controls are available for left and right movement as well as negative thrust from the retro-rockets.

If the game finished here, it would be exciting, but having completed your training mission, the real test is yet to come. The task is now to steer the craft through a tortuous maze to pick up people from the surface, without either crashing or running out of fuel. This is a challenging and well-written game, and well worth considering.

There are two versions of 3-D maze games in this selection: Sultan's Maze is supplied by Gem Software, and Phantom Slayer by Microdeal. Sultan's Maze gives the appearance of being an excellent game when it is first played. It is perhaps unfortunate that viewing Phantom Slayer immediately after tends to detract from this initial opinion. Again, it is a case of a machine code version showing up the deficiencies in Basic.

In spite of this, Sultan's Maze is still worth considering. The scene is set in Hampton Court maze, where the Sultan's bodyguard attempts to avenge his robbed master. The maze is viewed from above at the start, which helps with your orientation, if nothing else, as you attempt to negotiate the maze while viewing it in 3-D from the inside. If you are prepared to sacrifice large amounts of energy, you can look at the map again or even climb through the hedges. There are several jewels lying on the paths, and as well as picking these up, you have to avoid running into the guard (who appears in good, ie nasty, graphics as he leaps out at you).

Phantom Slayer from Microdeal is a similar game, involving a maze and unpleasant guardians. The maze inhabitants this time are phantoms who spring out at you. These are difficult to destroy and even though you are equipped with lasers, the best bet is to shoot, turn and run for cover behind a hedge when you see a phantom. The graphics are the smoothest I have seen on a Dragon, showing not only the hedges at each location, but their changing appearance as you turn slowly round. You get audible warning of the approach of the phantoms as well as a training program to allow you to get used to rushing round the maze. There are two types of maze in which you can play this game, and it is one of the most realistic, high-speed games that I have seen for some time, making use as it does of the sound and graphic potential of the Dragon.

US lead

It is clear that the American originators of this game have not wasted their 18 month head-start on us in 6809 programming skills, but it cannot be long before there are British games that are just as good. The extra time spent on writing in machine code is well worth it, if this is the sort of result that can be expected. Although Dragon Basic is faster than Sinclair's version, it is not really good enough for high-speed action games, and it would seem that anyone considering this type of game would do well to acquire Lance Leventhal's excellent book, *Programming the 6809*.

With this in mind, it is perhaps surprising that there are so few cartridges of games available for the Dragon. It is comparatively easy to blow a couple of EPROMs with a good machine code program, as Dragon Data itself has demonstrated, seeing that the cartridge port on the Dragon is one of its main selling points. This would avoid the problems sometimes encountered with the cassette interface, although I am glad to say that none of these games gave much trouble in loading.

This concludes the selection of arcade-type programs that are available. With more and more games on the shelves in the High Street, it is good to see that originality is not neglected. Friends of mine seem to prefer the maze chase games to the alien-zapping variety, and these are the games that rely on a combination of hand-eye skills and logical thinking — perhaps a pointer for the way games should go in the future.■

Software reviewed this month

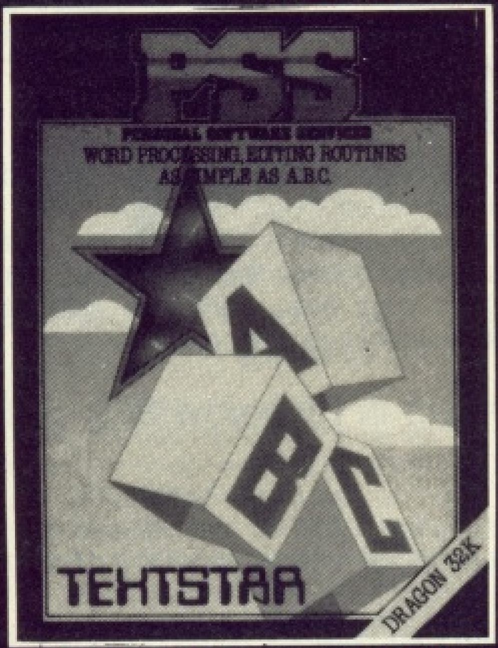
Supplier	Games	Supplier	Games
Gem Software, Unit D, The Maltings, Sawbridgeworth, Herts	Alien Blitz, Space Mission, Monster Mine, Sultan's Maze, All £7.95	Apex Trading Ltd, 115 Crescent Drive South, Brighton, E Sussex	Arcade Action £3.95
Tiger Software, 63 Devonshire St, Monkwearmouth, Sunderland, Tyne & Wear	Missile Defender £5.75	Salamander Software, 17 Norfolk Rd, Brighton, E Sussex	Grand Prix £7.95
		B & H Software, 208 King St, Cottingham, Hull	Gamestape 1 £10.00
Microdeal, Deal House, 41 Truro Rd, St Auste'', Cornwall	Defense, Phantom Slayer, Both £8.00	Computer Rentals, 140 Whitechapel Rd, London, E1	St George and the Dragon £6.95

THE POLICY OF PSS IS TO GUARANTEE A COMPLETE REFUND IF NOT COMPLETELY SATISFIED WITH YOUR PURCHASE

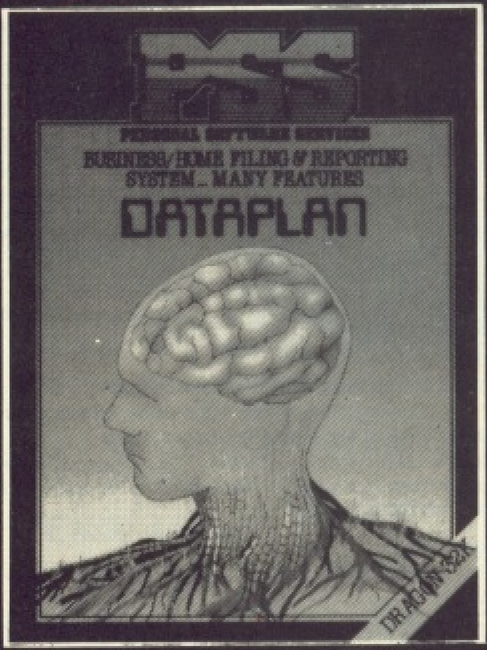
Personal Software Services

Presents

Fantasy, Heroes & Realities for DRAGON 32K







TEXTSTAR 12·95

TEXTSTAR ENABLES THE USER TO CONSTRUCT FILES IN ASCII FORMAT WHICH MAY BE RECORDED ON CASSETTE TAPE AND SUBSEQUENTLY RELOADED FOR EDITING, EXAMINATION OR PRINTING.

TEXTSTAR MAY BE USED EITHER AS A WORD PROCESSOR INCLUDING ALL THE USUAL FUNCTIONS OR TO EDIT BASIC PROGRAMS.

TEXTSTAR WILL HANDLE UP TO 21000 BITS OR A 20K PROGRAM ON 32K MACHINES. THIS IS THE EQUIVALENT OF 6 PAGES OF A4 TEXT PER LOADING.

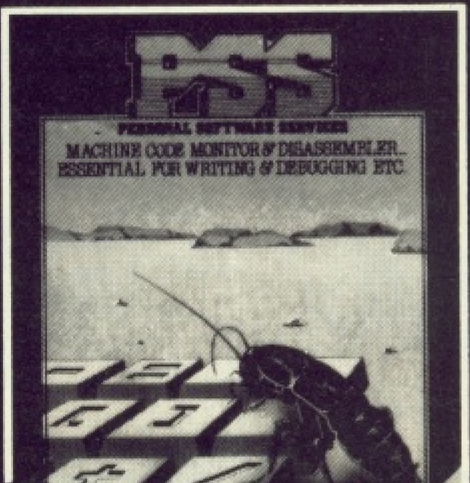
DRAGBUG 12·95

DRAGBUG IS ESSENTIALLY A MACHINE CODE MONITOR FOR THE DRAGON 32K GIVING THE USER EASY WRITING, ENTERING AND DEBUGGING FUNCTIONS FOR MACHINE CODE WRITING. IT INCLUDES ALL THE FEATURES OF PROFESSIONAL MONITORS FOUND ON LARGER MACHINES.

ATTACK 7·95

ATTACK IS A SUPER FAST, ALL MACHINE CODE ARCADE STYLE GAME FOR YOUR DRAGON 32K.

YOU ARE THE CHIEF SECURITY OFFICER ON THE PRISON PLANET 'KOVENTRI' WHERE ALL THE CAPTURED SPACE INVADERS ARE KEPT UNTIL A HUMANE WAY OF DEALING WITH THEM CAN BE FOUND. THERE HAS BEEN A MAJOR BREAKOUT AND IT IS A RACE AGAINST TIME TO STUN THE INVADERS AND CARRY THEM BACK TO THE SECURITY COMPOUND. AFTER BEING IN THE OPEN TOO LONG THEY MUTATE AND BECOME MUCH FIERCER. SEE HOW LONG YOU CAN KEEP THEM ALL LOCKED UP FOR.



DATAPLAN 12·95

DATAPLAN IS A DATABASE TYPE FILING SYSTEM WHICH ALLOWS THE USER TO ACCESS, SORT AND PRINT INFORMATION AS IT IS REQUIRED.

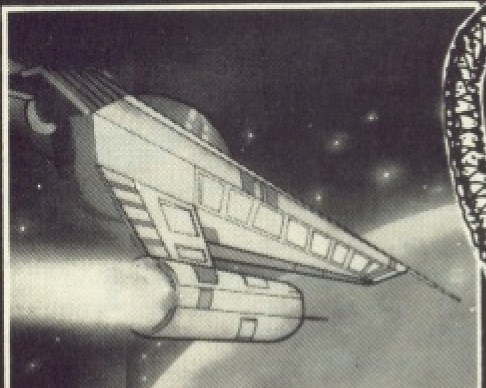
IT IS ENTIRELY MENU DRIVEN FLEXIBILITY IS ITS STRONG POINT

DATAPLAN WILL STORE UP TO 200 LINES OF INFORMATION EACH OF 64 CHARACTERS OR 100 RECORDS EACH OF 127 BITS.

STARTREK 7·95

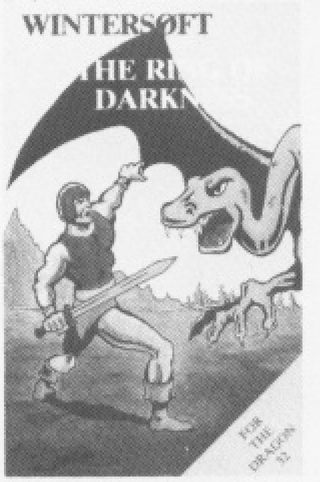
THIS VERSION OF THE POPULAR GAME OF STAR TREK PUTS YOU IN COMMAND OF THE SS ENTERPRISE DURING THE WAR WITH THE EVIL KLINGONS. YOU ARE TOLD THAT THE EMPIRE HAS BEEN INVADED AND IT IS YOUR MISSION TO DESTROY THE ENEMY.

FEATURES INCLUDE: BATTLE COMPUTER, LONG/SHORT RANGE SENSORS, WARP DRIVE, IMPULSE ENGINES, PHASERS, PHOTON TORPEDOES ETC ETC.



SEND CHEQUE OR PO TO PSS
452 STONEY STANTON ROAD
COVENTRY CV6 5DG

AN INCREDIBLE EXPERIENCE FOR ADVENTUROUS DRAGON OWNERS . . .



FROM WINTERSOFT

THE RING OF DARKNESS

The game created to be the most complete, enthralling, addictive and detailed adventure ever written for the Dragon 32. A whole graphic world (of nearly 3000 travel days) with kings, princesses, mad jesters and dangerous quests will unfold before you. Across ocean, river, mountain and forest you travel to trade in many towns and dare the depths of vast dungeons (more than 9 levels deep with over 20 different creatures in hi-res 3-D graphics), in search of fortune and the hidden curse of the Dark Ring. Many hours of mystery, suspense and raw excitement await you.

"The most impressive adventure tested . . . soon displaced breakfast TV in our house" ***Your Computer*** **(April) £10.00**

AND FOR REALLY HUNGRY DRAGONS:

Pepper's Game Pack — Masterbrain, Pepper's Breakout, Mushroom Muncher, Chess Board Tracker, Chameleon Run, Nad the Necromancer **£7.95**

Dragon Trek
"Excellent value for money . . . the title sequence was magnificent" *Your Computer* **£6.99**

Artist's Designer (high-resolution utilities) **£6.99**

All prices include p&p, VAT and the Wintersoft guarantee of quality and reliability.
Available from good software outlets, or send cheques/PO to:

S. W. WINTER & Co. Ltd.

101 Westminster Bridge Road
London SE1 7HR
Tel: 01-928 5945 01-633 9611



COLOR COMPUTER NEWS

What is it? It is a journal dedicated to the Motorola 6809 processor and the computers that are built around this Rolls-Royce of 8 bits CPUs.

Putting the hyperbole aside, in practice this means the Tandy color computer, where it all started and now also the Dragon 32. It contains information programs, reviews, hints and tips of a higher standard than any general magazine.

WHERE IS IT FROM? It is published and printed in the USA and therefore you can know what is happening in the USA before it happens here. Learn about new software before the UK, read about FLEX and 0S9 and the software available BEFORE you buy your disc systems.

GET YOURSELF IN THE KNOW WITH CCN

Single copies	£2.45 including p&p
6 months subscription	£14.00 including p&p
12 months subscription	£26.00 including p&p

GRAVESEND HOME COMPUTERS LTD

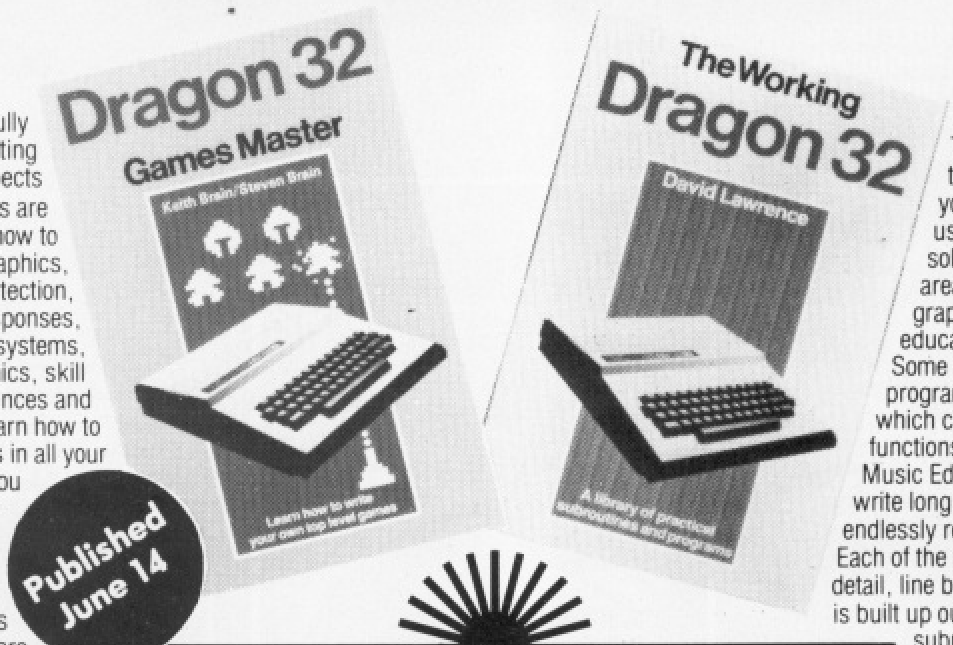
39 The Terrace, Gravesend, Kent DA12 2BA

(0474) 50677

For **DRAGONS** and **DRAGON support**

SPECIALLY FOR THE DRAGON USER
2 books from Sunshine

Dragon Games Master is a carefully structured book about writing games programs. All major aspects of interactive computer games are considered as you learn how to handle sound, colour, graphics, movement, mazes, detection, decisions, responses, consequences, scoring systems, status displays, economics, skill levels, title sequences and instructions. You will learn how to include these features in all your own games. The book takes you through each step line by line from writing the simplest games right through to the design and construction of first calls adventure programs which rival commercial software in their complexity and presentation. (160pp) **£5.95**



The Working Dragon is the book for those of you who dream of putting your computer to some practical use. It is based on a collection of solid, sophisticated programs in areas such as data storage, finance, graphics, household management, education and games of skill. Some of the more advanced programs include a Text Editor, which can perform many of the functions of a word processor, and Music Editor, which will let you write long music programs without endlessly repeating similar routines. Each of the programs is explained in detail, line by line. And each of the programs is built up out of general purpose subroutines which, once understood, can form the basis of any other programs you need to write. Advanced programming skills spring out of the discussion explaining each subroutine. The collection also leaves you with a wide range of practical application programs which might otherwise only be available on cassette. (160pp) **£5.95***

Trade/Dealer enquiries welcome

*Available through W.H. Smith and computer dealers.

SUNSHINE

(Also publishers of Popular Computing Weekly and Dragon User magazines)

Please send me ☐ **The Working Dragon 32** at £5.95 each ☐ **Dragon 32 Games Master** at £5.95 each

I enclose a cheque/postal order for £
payable to **Sunshine Books**, 19 Whitcomb Street, London WC2H 7HF

Name ____________________

Address ____________________

____________________ Signed ____________________

We can normally deliver in four to five days.

Jockeying to be first in the joystick race

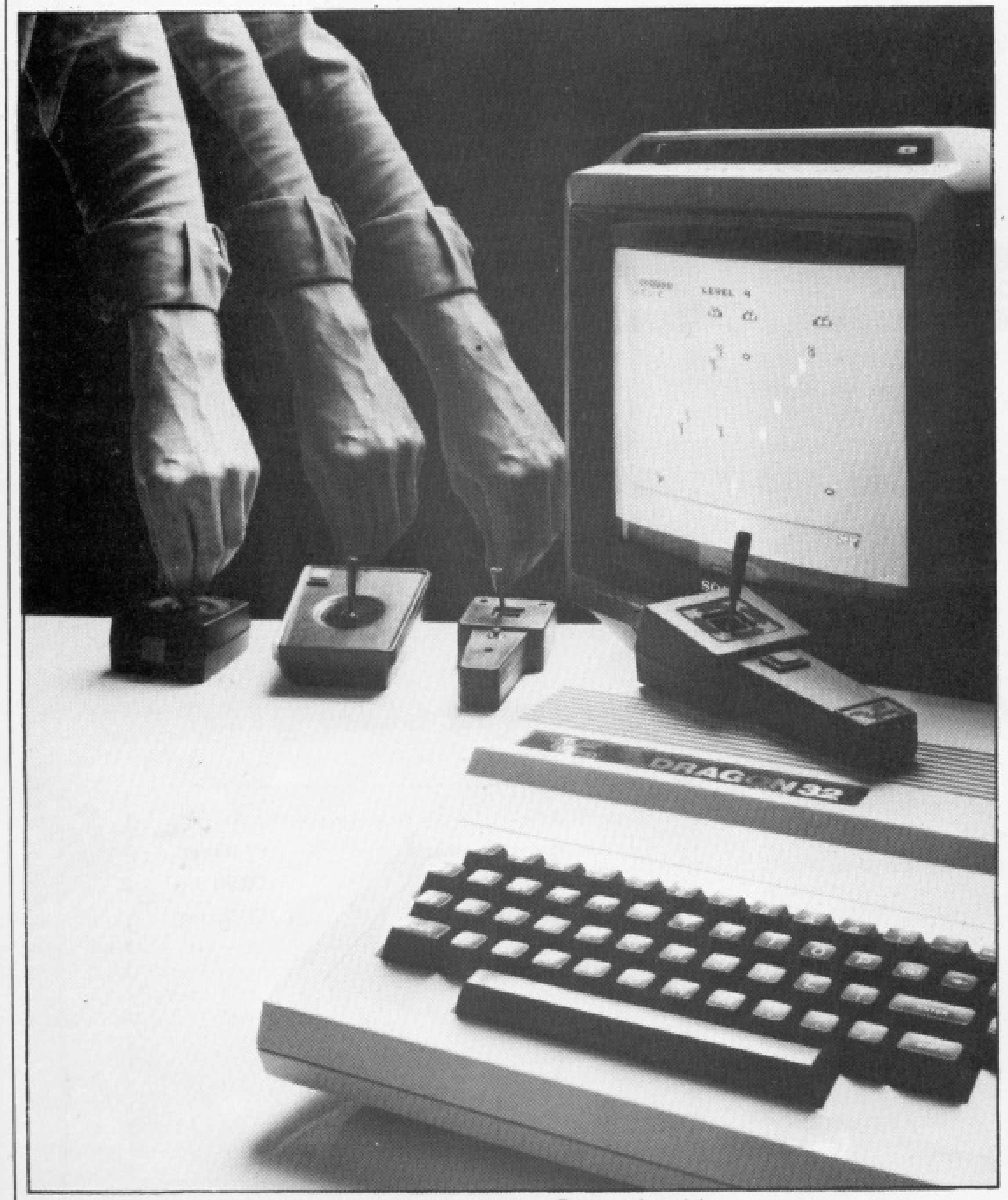
*If your joysticks are worn out, or were never up to much in the first place, you now have a wide selection to choose from – **Clive Gifford** looks at the range.*

THE MOST POPULAR peripheral available for the Dragon must be the joystick. Dragon owners do not need extra memory packs or an add-on keyboard at the beginning, but some of the best arcade games need a joystick, and many utility programs benefit from control by a joystick which can be many feet away from the computer itself. In reaction to the limited choice available last Christmas, many companies, both large and small, have started producing their own joysticks for the Dragon.

There are two basic types of mechanism — switch and potentiometer. The switch type consists simply of four or eight switches aligned with the X, Y and the two diagonal axes. Moving the column in a certain direction activates a certain switch. The value given is either an 'on' or an 'off' and this type of operation can be said to be digital. The switch type, then, gives a less accurate value though it is usually more rugged, a good example of one being the Atari joystick. One variant of this type is the mercury switch joystick which works using a similar principle to a spirit level and is found on the Atari Le Stick.

The potentiometer type allows diagonal movement and is altogether more sensitive. It gives a variable value of both the X and Y axes and can be described as an analogue operation. On the Dragon, with its extremely useful JOYSTK command, it makes sense to use a potentiometer mechanism and in fact all eight of the joysticks reviewed use this system.

None of the eight can be described as semi-professional sticks, which are usually self-centring and are of a higher quality, aimed at the serious games player: most use a potentiometer system but with some you can choose the stiffness of action that you require.



More and more companies have started producing Dragon joysticks

Easy action

The actual feel of a joystick is very subjective. I prefer an easy, fast action while other people stick with a stiff joystick. But the sensitivity and accuracy of a joystick is as important and is much less subjective. To test the accuracy of the joysticks, I used several programs of my own — a sketchpad and a racing game. To test the quickness of response, I used Microdeal's Racer Ball, a Pacman-type game with a complicated maze that requires many changes of direction.

I had heard of problems encountered with joysticks not reaching the extreme corners of the screen, and in fact the sheet of instructions supplied with the Radio Shack/Tandy ones discusses this in some detail. However, none of the joysticks failed to reach any of the corners.

The first joysticks I looked at were the official Dragon Data ones. The old style joystick was a bulky affair in an unattractive case. It was poorly constructed though it had a solid stick movement and at £14.95 was fair value. The company has phased this type out and introduced a new, much more attractive style whose construction is very solid. Unfortunately the extra quality has put an extra fiver on the price (£19.95). This new style is a lot less bulky though it is still quite large, with the dimensions (excluding the actual shaft) being $6\frac{1}{4}$ by $2\frac{1}{2}$ by $1\frac{7}{10}$ inches. The actual shaft was high ($1\frac{7}{10}$) and its movement was stiff. The fire button, square and situated on the top-surface just behind the stick, has a nice clicking action. These were my favourite of the three types widely available through retail outlets.

The second pair I looked at were the Tandy/Radio Shack joysticks which, at the same price as Dragon Data's, are in direct competition. The Tandy ones are difficult to hold, being almost square (3 by $2\frac{4}{5}$ by $1\frac{2}{5}$ inches) in shape. I did not like the fire button on the front of the joystick: it is large and square shaped but with such a small pitch you hardly know when you have ▶

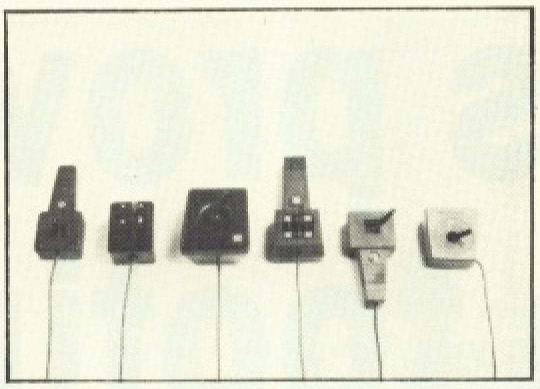
◀ pressed it. The stick's action was not too stiff but the plastic covering on the shaft kept turning round as I gripped it. This was a little annoying and at a price of £19.95, they are not the best on the market.

Triplets

Microdeal's efforts are the third and final pair out of the batch to be widely available retail. Its sticks bear more than a marked similarity to Midwich's and Clares', suggesting that they are all produced by the same manufacturer. Interestingly these joysticks are being sold at different prices. The only visible distinguishing feature between the pairs is the screws used to secure the joystick housing.

These sticks are similar in shape to the new ones from Dragon Data and Cascom (covered later). They have a small, round firing button just below the stick which is fairly short at just over 1¼ inches high. All three of the joysticks had the same stiff movement. They all worked well in the three tests though I found them rather slow on the arcade game test. The pair that came from Midwich, however, was obviously designed with the Australian market in mind. It featured a slightly different movement to any of the others: when I pushed the stick down, the item that I was controlling on the screen went up and vice versa! Thankfully, the left and right movement worked correctly, but quality control just isn't what it used to be. I'm sure, however, that Midwich's other sticks are not like my pair. The cheapest of the three sets was Clares' at £15.95, with Midwich's £15.98 plus 57p postage and packing, and Microdeal's a rather pricey £19.00.

The cheapest joysticks come from Talon Electronics. These were also the smallest in size (3⅕ by 2 by 1 inches) and the lightest at 4 ounces. The joystick's mechanics are cased in the sort of box sold in



electronics shops for your own personal electronic projects, with a metal top finished with enamel paint. I imagine that these sticks are home-made but there is no crime in that and in this case I think the old phrase "small is beautiful" applies. These joysticks are easy to use with an excellent spring-suspended fire button on the front side. They are small enough to hold in your hand and offer good, fast control around the screen. Their only failing is that they are a little too easy to move and this could be seen on the sketchpad program. Though they are a little unattractive, they work very well and at £15.00 inclusive of post and packing they are excellent value.

The Dragon Dungeon joysticks are priced at £19.95 which puts them in the Dragon Data/Tandy bracket. This joystick is unlike any of the others with a compact box measuring just over 3 inches long by 2½ inches wide by 1⅖ inches high. The fire button is raised on the top surface of the stick and is the best of the batch reviewed. The action of the joystick is also good, with only a tiny amount of pressure necessary to sweep the shaft into any position. The whole unit has a quality feel about it. My only major complaint is that the shaft, only just over 1 inch high, was a little on the short side. Perhaps I'm biased in favour of this joystick because I achieved my highest ever score of 48,700 on Racer Ball compared to my previous high of 32,330 using other joysticks!

The last joysticks reviewed are the Cascom ones. These sticks cost a total of £15.70 including postage and compare favourably with some of the more expensive ones. They have a very similar design to the ones from Microdeal/Midwich/Clares, with the main differences being the longer shaft (at 2 inches, the longest of all the joysticks reviewed) and the much lighter feel which is somewhere between the stiff Microdeals and the easy Talon Electronics. The joystick lead was the shortest at 42 inches but this is still reasonable and can be easily lengthened. The lead on this joystick was of a much heavier duty than the others. This stick had a nice balance between the ease of movement and the accuracy. Unfortunately it was a little slower in some circumstances, but as a general joystick it cannot be beaten.

In conclusion, all of these joysticks are solidly constructed, well finished and easy to use. The best way to decide for yourself, is to try and use a few different pairs. However, if you are prepared to order your joysticks by mail, I think you will get a better deal.

Favourites

My favourite pairs are definitely those from Cascom, Dragon Dungeon and Talon Electronics. The Cascoms would make a good family joystick, while both the Talon and the Dragon Dungeon ones are ideal for fast-moving situations if you can get used to their little idiosyncrasies. If you prefer a stiffer action joystick then the Clares model at £15.95 must be considered.

It is a shame that no semi-professional joysticks are available as it would have been very interesting to review them against the standard types. But I'm sure that this more expensive type of joystick will start to arrive in Britain soon. ■

Joysticks reviewed: from £15.00 to £19.95

Talon Electronics
104 Woodbridge Road
Rushmere St Andrew
Ipswich
Suffolk
IP4 5RA
(0375) 31837

Price: £15.00 a pair including postage
Weight: 4oz

Midwich Computer Company
Rickinghall House
Hinderclay Road
Rickinghall
Suffolk
IP22 1HH
(0379) 898751

Price: £15.98 a pair plus 57p p&p
Weight: 6 oz

Dragon Data
Available through retail outlets such as Boots and Stirling Microsystems
241 Baker Street
London NW1 6XE
01-486 7671

Price: £19.95 a pair (the previous model at £14.95 a pair is no longer available)
Weight: 5½ oz

Clares
Providence House
222 Townfields Road
Winsford
Cheshire
(06065) 51374

Price: £15.95 a pair including postage
Weight: 6 oz

Microdeal
41 Truro Road
St Austell
Cornwall
PL25 5JE
(0726) 67676
Also available from other dealers such as Chromasonic
48 Junction Road
London N19 5 RD
01-263 9493

Price: £19.00 a pair
Weight: 6 oz

Cascom Computer Accessories
67 Elstow Road
Bedford
MK42 9NT
(0234) 44762

Price: £14.95 a pair plus 75p p&p
Weight: 6 oz

Tandy
Available through the company's own retail stores

Price: £19.95 a pair
Weight: 5 oz

Dragon Dungeon
PO Box 4
Ashbourne
Derbyshire
DE6 1AQ
(0335) 44626

Price: £19.95 a pair including postage
Weight: 6 oz

Boots provides a firm footing for Dragon's future

***Graham Cunningham** talks to Anton Boyes of Boots the chemist, whose move into home computers has contributed to the Dragon's success.*

DID YOU buy your Dragon at Boots? The chances are that for one in three of you the answer will be yes, because Boots estimates that about one-third of Dragons sold so far have passed over its counters. The chances are that you will also be a happy Boots customer — because the company reckons that fewer Dragons are returned as faulty than any other machine.

Even if you didn't buy your machine at Boots, it is a place worth checking for Dragon software and add-ons. For example, the company expects to be the first place selling the new disk drive system from Dragon Data.

Boots itself is a happy customer of Dragon Data. In the words of Anton Boyes, who is responsible for organising Boots' home computer sales: "It would be an understatement to say that we are tremendously pleased with the Dragon."

Boots' move into home computers began with less than a dozen of its larger stores selling Vic20s and Texas Instruments' TI99. In August last year the number of stores rose to 80 and the Dragon made its début, appearing in Boots' outlets that month. More than 130 stores, covering every major city centre, stock the Dragon now, and the aim is to reach 200 before the run-up to Christmas this year.

Boots' first sight of the Dragon, in pre-production form, was in May last year. At the time Boots was looking at "everybody who was in the market" with a view to expanding its home computer sales. When they saw the Dragon they "were very impressed — it selected itself".

According to Boyes, the Dragon beat off rivals because it was "effectively a finished product" with a large memory and high-quality graphics. The fact that the Dragon resembled a typical computer terminal, with a proper typewriter keyboard, also stood in its favour.

The BBC micros were not a proposition then because they were only being offered through mail order. Nor was Sinclair's Spectrum ready at that time.

Central purchasing of home computers is handled by Boots' stationery and book merchandise department which also covers toys. An established relationship with toy manufacturer Mettoy, Dragon Data's parent company until it went independent last November, also eased the way to acceptance.

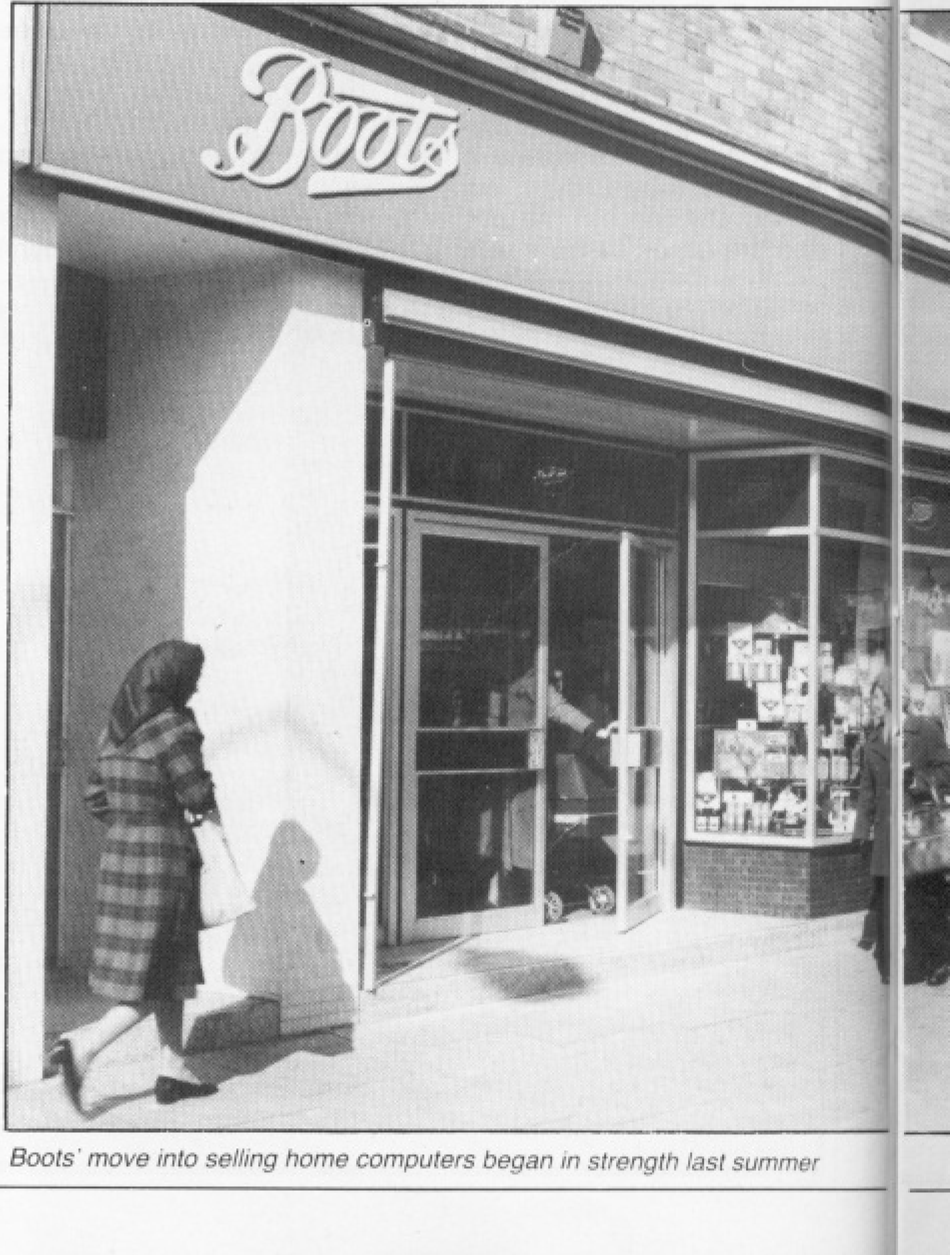
> *Sales of the TI99s were slow and the system was dropped*

Since that August début, Boots' microcomputer sales, including the Dragon as its "leading line", have not looked back. The most recent estimates say that 55,000 Dragons were sold up to the end of this February. And Boots thinks that it accounts for one-third of all Dragon sales. As Boyes says: "It is a line with which we have associated ourselves."

But Boots has no objection to anybody else selling the Dragon. It achieved its strong supply position not by contract stipulations with Dragon Data but by the size of the orders it placed for the machine.

The Dragon is only part of Boots' home computer drive. The first trials yielded "smallish sales" of the Vic20, and even fewer TI99s were sold — "not in hundreds but in dozens". The TI system was finally dropped towards the end of last year. But the August move into 80 stores, with the Dragon selling alongside the Vic20, was a success.

Boots has expanded its range since then — it began to stock the ZX81 in the run-up to



Boots' move into selling home computers began in strength last summer



Anton Boyes: "It would be an understatement to say that we are tremendously pleased with the Dragon"

Christmas and the Spectrum in February. At the top end of the home computer market it also stocks the Commodore 64.

Last Christmas the Vic20 sold strongly, and Boots would sell more if it could get hold of them. At Christmas more Dragons could also have been sold, but the company has no complaints about supplies.



"We have had a very fair share of Dragons," Boyes said.

Boots has put as much effort into how it sells micros as into which machines to stock. Each store's home computer section is "very obviously a separate part" with enough space for a customer to experiment with all the machines in stock. The Dragon is set up with a Boots Thomson 14-inch tv and either a Bush 3150 cassette recorder or one of the two Boots models which is compatible with the Dragon.

Boyes added that sales staff have been given special training in microcomputers, ranging from going back to college to studying manuals. The training continues and is given a "high priority". The aim is for sales staff on the spot to provide "good advice that is not intimidating".

"Packaging in general often lets down the software"

Also in stock is a range of software, although Boyes commented: "We thought Dragon software suppliers were a bit slow off the mark." The notable exception was Microdeal, whose Space War, Donkey King and Planet Invasion head the list of Dragon best-sellers at Boots. Utilities packages for education and games are selling more slowly, but Boyes is not discouraged by this: "They will make a market in the long-term."

He is "mightily relieved" that the standard of packaging is going up. New presentation packs for Dragon Data's software are ready — after Boots had spent some time pressing for an improvement. "The packaging in general often lets down the software," he explained.

Boots is keen to increase the range of packages it stocks. A panel of users — the Boots Computer Club, in fact, which is based in Nottingham — checks the quality of all the software before Boots will agree to stock it.

The company's hardware testing is also thorough. Out of every 1,000 machines it receives it batch tests 80. Boyes commented that customers returned fewer Dragons as faulty than any other system. He thought the failure rate "was surprisingly low for such a high technology product". When a customer does bring a machine back, a diagnostic cartridge, supplied by Dragon Data, is used on the spot to check the major functions.

All of the Dragons sold so far are still within their guarantee periods. Boots is setting up a system of service agents to provide support when the guarantees start to expire.

The good relationship with Dragon Data is set to continue despite the fact that Boots still talks to all the major manufacturers about selling their products. At the moment the company has no plans to stock the Lynx, a major rival, considering that the Dragon remains "the home user's ideal machine".

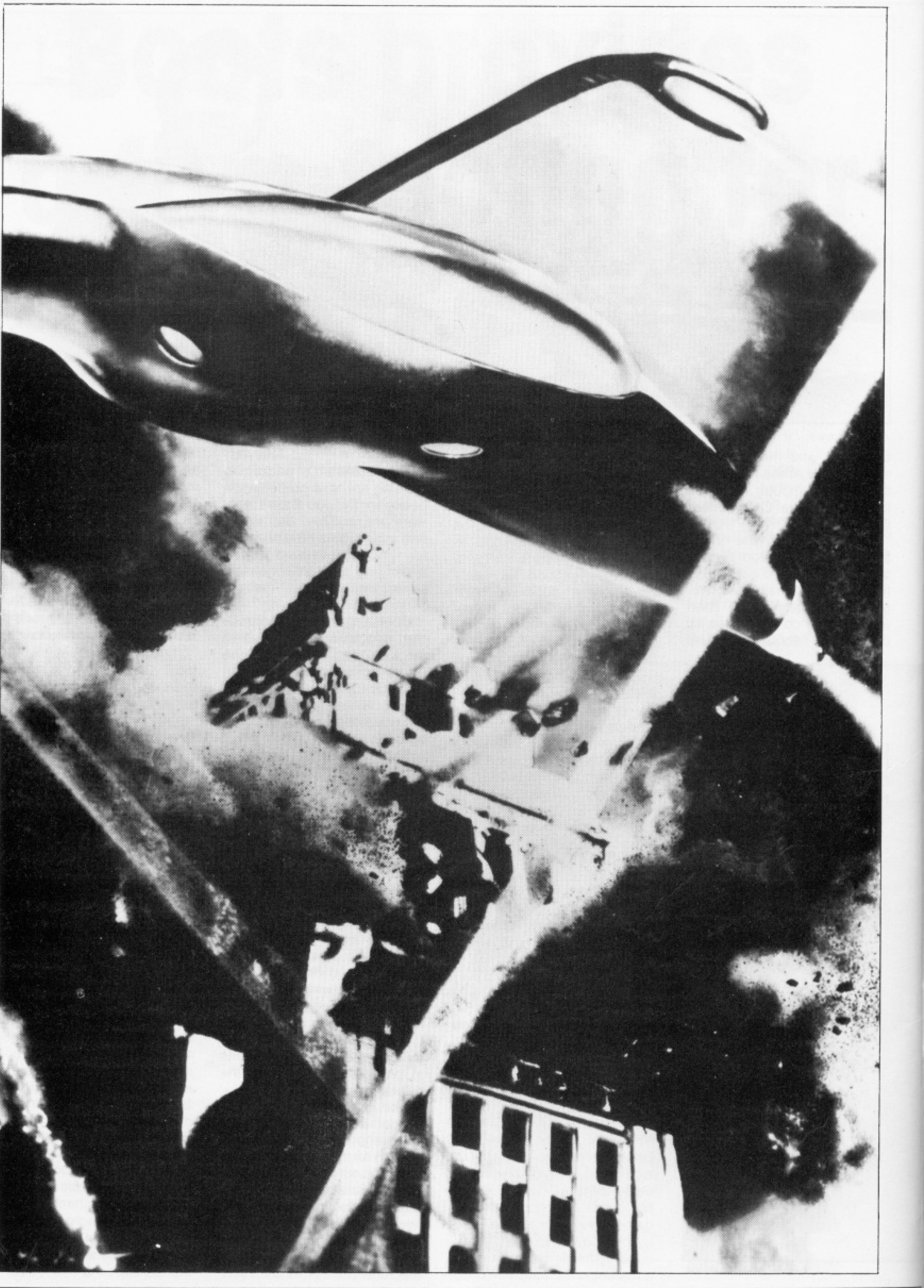
In fact future models from Dragon Data hold more appeal to Boots. As Boyes said: "We would look very favourably at stocking any Dragon machine which falls within our market — the home user." Even the possibility of selling a bigger, business machine cannot be ruled out in the long-term.

Selling a business machine cannot be ruled out

Demand for the present Dragon is still high. Partly this is due to a backlog built up over Christmas; but Boyes also puts it down to the "idea of home computers striking a chord generally in the UK". A national advertising campaign this spring is expected to boost demand for home computers even further.

The Dragon 32 is to get a boost itself this spring. Boots will be selling the 64K upgrade along with the Dragon Data disk system as soon as it is available. The drives will cost about £275 including the controller. Boots also plans to start selling the Seikosha printer compatible with the Dragon for about £230 including the connecting cable.

So new products will not displace Boots' affection for the Dragon. As Boyes said: "We feel very close to this product." He himself feels closer still — he has a Dragon at home for practising programming and sometimes testing software. ■



Your chance to program and repel the aliens

*Save the earth from the alien invaders with **Andrew Black's** Dragon version of Missile Command.*

DEFEND EARTH'S FOUR remaining cities from the missiles of the alien invaders, using this variation of Missile Command. Destroy the invaders with your laser — which you move with a joystick (right) and fire using the space bar. If this is awkward, place the joystick on a flat surface and move with one hand and fire with the other.

Instructions

1. Maximum number of missiles — this is the number of missiles to be fired before the game ends
2. Skill levels — there are two types of difficulty:
Levels 1-3: one missile at a time
Levels 4-6: two missiles
Levels 7-9: three missiles
Levels 1, 4 and 7 — you only have to be three spaces away to destroy a missile
Levels 2, 5 and 8 — two spaces
Levels 3, 6 and 9 — one space
3. Angle — this is the maximum move that a missile can make in one turn (left or right)
4. Moving — use the joysticks (or the arrow keys — as explained below)

Program notes

0-150	Sets the variables
20	Speeds up the Basic program
160-230	Sets up the screen display
240-320	Moves laser point
330-370	Sets start of missiles
380-500	Moves missiles and checks to see if any hit the cities
510-540	Draws explosion of cities
550	Sets laser point
560-620	Fires laser and checks to see if missile is hit
630-720	Displays score/asks if another go is desired
730	Resets laser point

Main variables

X and Y — coordinates of your laser
MX(Z) and MY(Z) — coordinates of the missiles
TC — total number of cities remaining
C(Z) — cities remaining
B — angle of movement by missiles
L — skill level
S — your own particular score
HS — high score
M — number of missiles
M$ — movement using keys and firing
N — number of missiles fired
MM — total number of missiles allowed
J — joystick value
N$ — repeat key
P — position of explosion centre
W — random movement of missiles

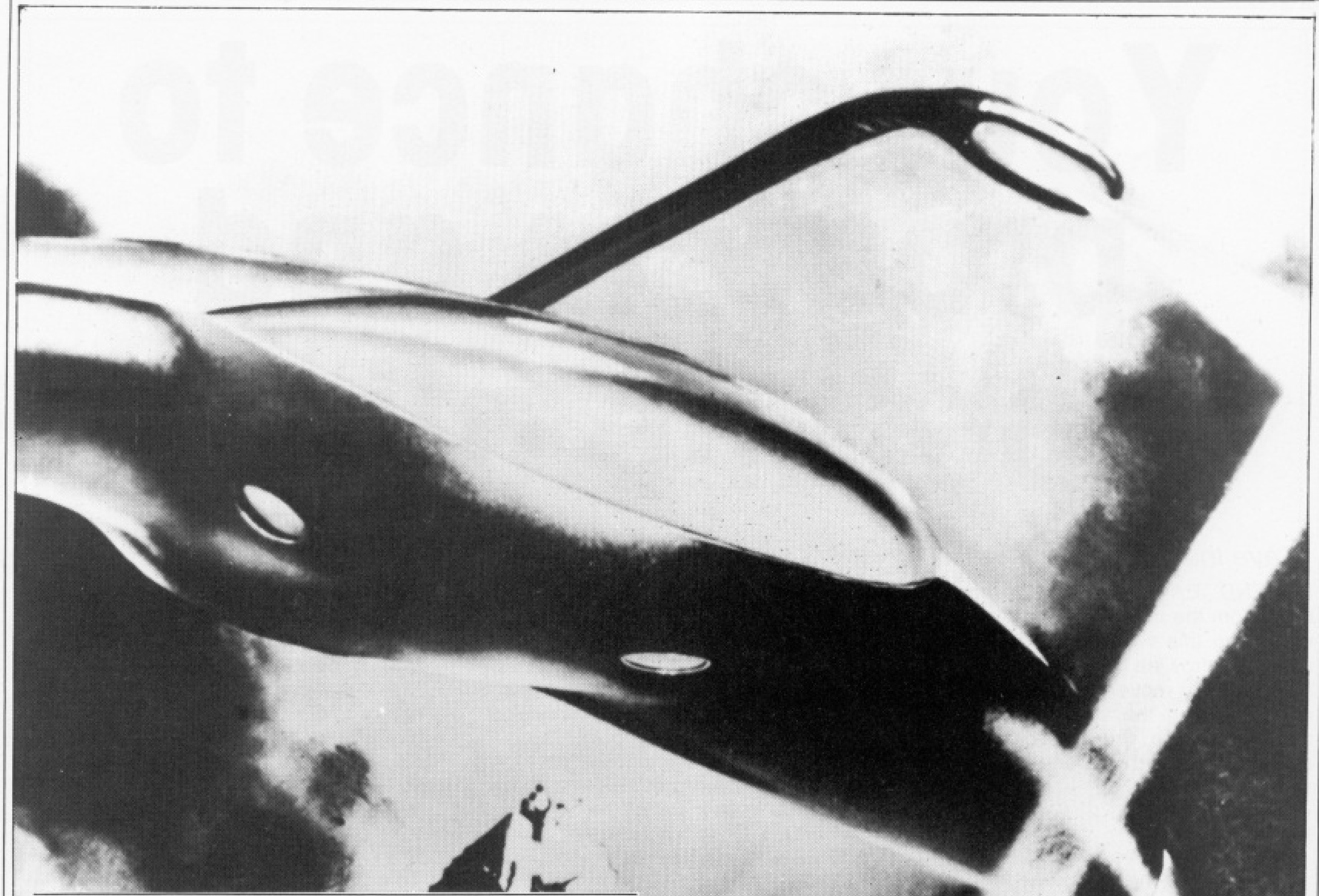
Key movement

To move the laser with the keys (you can't move diagonally, if you do, it's harder) replace lines 270-300 with the following lines:

```
265 IF N$ = " "THEN N$ = " "
270 N$ = INKEY$: IF M$ = " " THEN N$
    = N$
275 N$ = M$
280 X = X -2 * (M$ = CHR$(9)) + 2 *
    (M$ = CHR$(8))
290 Y = Y -2 * (M$ = CHR$(10)) + 2 *
    (M$ = CHR$(94))
300 X = X + 2 * (X > 255) -2 * (X < 0) :
    Y = Y + 2 * (Y > 179) -2 * (Y < 0)
```

```
0   CLS : INPUT "MAX NO OF MISSILES"; MM
1   IF MM 50 OR INT(MM) < > MM THEN 0
10  REM MISSILE COMMAND
20  POKE & HFFD7,0
30  CLS : X = 128 : Y = 96 : TC = 4 : S = 0
40  FOR Z = 1 TO 4 : C(Z) = 1 : NEXT
50  INPUT "ENTER — SKILL LEVEL (1—9)"; L
60  IF L < 1 OR L > 9 OR INT(L) < > L THEN 50
70  INPUT "            - ANGLE (1—3)"; B
80  IF B < 1 OR B > 3 OR INT(B) < > B THEN 70
90  IF L < 4 THEN M = 1 : GOTO 120
100 IF L < 7 THEN M = 2 : GOTO 120
110 M = 3
120 ON L GOTO 130, 140, 150, 130, 140, 150, 130,
    140, 150
130 A = 3 : GOTO 160
140 A = 2 : GOTO 160
150 A = 1 : REM A = NO OF PIXELS AWAY
160 PMODE3, 1 : SCREEN 1,0 : PCLS 1 : COLOR
    3,2
170 IF TC = 0 THEN 630
180 IF C(1) = 1 THEN CIRCLE (10,191),10,4 : PAINT
    (10,190),4,4
190 IF C(2) = 1 THEN CIRCLE (64,191),10,4 : PAINT
    (64,190),4,4
200 IF C(3) = 1 THEN CIRCLE (192,191),10,4 :
    PAINT (192,190),4,4
210 IF C(4) = 1 THEN CIRCLE (245,191),10,4 :
    PAINT (245,190),4,4
220 DRAW "C4, BM118,191; E10, F10"
230 PAINT (128,190),4,4
240 GOSUB 330
250 GOSUB 380 : GOSUB 550
260 GOSUB 730
270 FOR Z = 0 TO 1 : J(Z) = JOYSTK(Z) : NEXT
280 X = X -2 * (J (0) > 56) + 2 * (J (0) < 6) : X = X
    + 2 * (X > 255) -2 * (X < 0)
290 Y = Y -2 * (J (1) > 56) + 2 * (J (1) < 6) : Y = Y
    + 2 * (Y > 179) -2 * (Y < 0)
300 M$ = INKEY$
310 IF M$ = " "THEN GOSUB 560
320 GOTO 250
330 FOR Z = 1 TO M
340 MX(Z) = RND (255) : MY(Z) = 0
350 NEXT
360 N = N + M
```

Continued on page 24

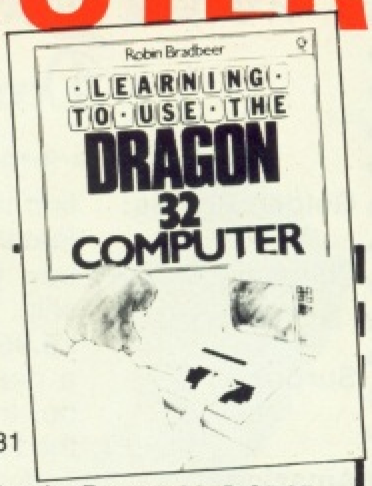


```
370 RETURN
380 FOR Z = 1 TO M
390 W = RND (2)
400 MX(Z) = MX(Z) - B * (W = 1) + B * (W = 2) :
    MY(Z) = MY(Z) + 1
410 MX(Z) = MX(Z) + B * (MX(Z) > 255) - B *
    (MX(Z) < 0)
420 IF PPOINT (MX(Z), MY(Z)) = 4 THEN 460
425 IF MY(Z) = 191 THEN MX(Z) = RND (255) :
    MY(Z) = 0 : N = N + 1
426 IF N = MM THEN 630
430 PSET (MX(Z), MY(Z), 3)
440 NEXT
450 RETURN
460 IF MX(Z) < 21 THEN C = C -1 : C(1) = 0 : P =
    10 : GOSUB 510 : GOTO 170
470 IF MX(Z) < 75 THEN C = C -1 : C(2) = 0 : P =
    64 : GOSUB 510 : GOTO 170
480 IF MX(Z) < 139 THEN P = 128 : GOSUB 510 :
    GOTO 630
490 IF MX(Z) < 203 THEN C = C -1 : C(3) = 0 : P =
    192 : GOSUB 510 : GOTO 170
500 C = C -1 : C(4) = 0 : P = 245 : GOSUB 510 :
    GOTO 170
510 FOR D = 1 TO 300 STEP 3
520 CIRCLE (P,191),D,4
530 NEXT
540 PCLS 2 : RETURN
550 CIRCLE (X,Y),3,3 : RETURN
560 LINE (128,179) - (X,Y), PSET
570 FOR Z + 1 TO M
580 IF X > = MX(Z) - A AND X < = MX(Z) + A
    THEN 610
590 NEXT
```

```
600 LINE-(128,179), PRESET : RETURN
610 IF Y > = MY(Z) + A AND Y < = MY(Z) - A
    THEN SOUND 100,1 : MX(Z) = RND (255) :
    MY(Z) = 0
620 N = N + 1 : IF N < MM THEN 590
630 PLAY
    "T8V3104GL3C03CDDFCCCFDECC04GL3C"
640 CLS
650 PRINT @ 256, "YOUR SCORE"; S
660 IF S > HS THEN HS = S
670 PRINT @ 320, "HIGH SCORE"; HS
680 PRINT @ 352, "DO YOU WANT ANOTHER GO
    (Y/N)?"
690 SCREEN 0,1
700 R$ = INKEY$ : IF R$ = "" THEN 700
710 IF R$ = "Y" THEN 0
720 IF R$ = "N" THEN END ELSE 700
730 CIRCLE (X,Y),2,2 : RETURN
```

LEARNING TO USE THE DRAGON 32 COMPUTER

This title is the latest in a new series of books which introduce newcomers to the most widely used micros in the marketplace.



Learning to Use the Dragon 32 assumes absolutely no knowledge about computers and the reader is shown even the most fundamentai operations such as "switching on" and "loading a program". The book leads the reader through simple programming and then onto graphics, with several programs which show how to achieve pictures and even animation.

The user-friendly approach is consistent throughout the text – not only are program listings clearly shown, but in many cases, a photograph is included to show what the program looks like when actually loaded and run!

The book contains a number of specially written programs which show the full potential of the Dragon 32.

£5.95
(incl. postage)

READ-OUT BOOKS AND SOFTWARE

Order Form

To: READ-OUT BOOKS
AND SOFTWARE
8 FORGE COURT, READING ROAD,
YATELEY, Nr. CAMBERLEY, SURREY.

24 hour Answering Service Tel (0252) 510331

Please send me ..... copy/ies of Learning to Use the Dragon 32 @ £5.95

☐ I enclose my remittance of £ .... (make cheques payable to Newtech Publishing Limited)

☐ Please debit my Access Card No. ☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Name ______________________

Address ______________________

____

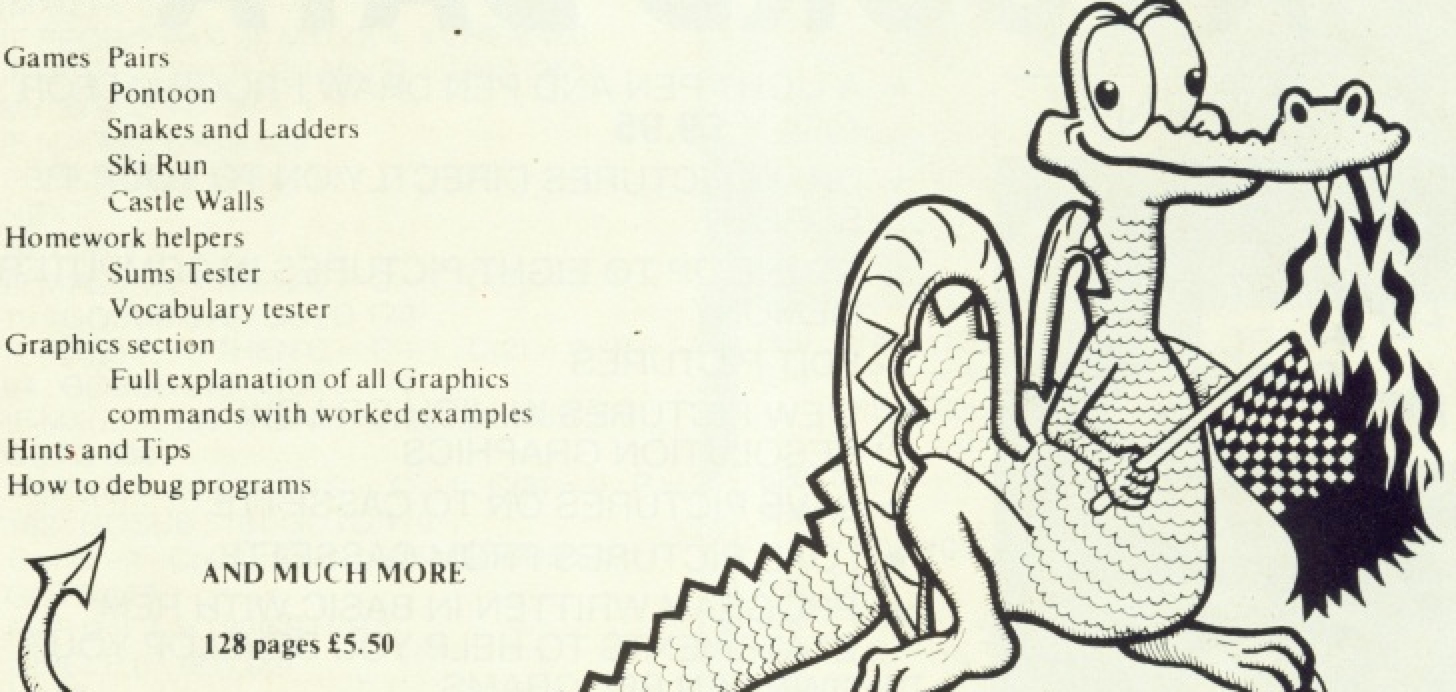
Signed ______________ Date ______________

DU5B

LOAD AND GO WITH YOUR DRAGON

32 PROGRAMS FOR YOUR DRAGON 32

* Games Pairs
  Pontoon
  Snakes and Ladders
  Ski Run
  Castle Walls
* Homework helpers
  Sums Tester
  Vocabulary tester
* Graphics section
  Full explanation of all Graphics commands with worked examples
* Hints and Tips
* How to debug programs



AND MUCH MORE

128 pages £5.50

PHIPPS ASSOCIATES

Dept D FREEPOST EM463 (No stamp required)
99 East St, Epsom, Surrey KT17 1BR.
Telephone 03727-21215. 24hr phone service.

Prices include postage but for air mail delivery in Europe add 90p (outside Europe add £1.70) per item.
Access and Barclaycard accepted

Delights of the open road

*As a taster to their new book, 'Dragon Games Master', **Keith** and **Steven Brain** explain how to construct a simple game which will test your skills as a player.*

DRIVING DOWN A winding road, dodging obstacles in a race against time — this may sound complicated but it can be done in a program of less than 40 lines. And once you understand how to produce a scrolling screen display you can incorporate it into your own programs to make them more exciting.

First we must sort out what different sections we will have to include in the program, and in what order we need to deal with them. The following are the major items to be considered in the development of the program in a sensible order of priority:

1) Draw the road
2) Place random obstacles
3) Put your car on the road
4) Take control
5) Test for collisions
6) Display time and distance
7) Create a way of winning the game
8) Make the program user friendly

The first question to consider is how to display a single strip of black tarmac, although this is really no problem as we could simply print the solid black graphic block (CHR$(128)) ten times.

```
60 PRINT CHR$(128); CHR$(128);
   CHR$(128); CHR$(128); CHR$(128);
   CHR$(128); CHR$(128); CHR$(128);
   CHR$(128); CHR$(128)
```

On the other hand, if you think a moment, you will realise that instead of having to type out CHR$(128) ten times you can use the STRING$ function. This will create a string of specified length filled with one particular character. The improvement is carried out by defining the road strip as A$=STRING$(10,128) and then printing A$ whenever you want to show this.

```
20 A$=STRING$(10,128)
60 PRINT A$
```

If we now add a return line and RUN we will get a straight black road which starts at the top left of the screen and runs down the left hand side until it reaches the bottom, when the screen will automatically scroll so that printing of the road continues.

```
120 GOTO 20
```

Although this works okay most real roads are not quite like that, so what about moving the road to the centre of the screen for a start? This can easily be achieved using the PRINT TAB command to move the print position to a specified column on the screen.

```
60 PRINT TAB(10);A$
```

The road is now printed down the centre of the screen but it is still dead straight and very unrealistic, so the next step is to make the road wind about. Let's set the start print position (A) at column ten and then produce a new random variable B which is added to A to displace the print position. B is produced by RND(3)−2 which will return −1 (1−2), 0 (2−2), or 1 (3−2), thus leaving the road to run straight, or making it deviate one column to the left or right after each calculation.

```
10 A=10
30 B=RND(3)-2 : A=A+B
```

Wandering

You will see that the road now winds about on the screen but beware, if you leave it to wander long enough, you will get an FC ERROR (dread the thought) if the TAB position becomes negative. Or the road will wrap around onto the next line, if it moves too far to the right, causing total confusion.

Clearly some limits need to be set for the TAB position and this can be done by checking A. We will set the left limit at 1 and the right limit at 20 (to leave enough room to the right of this to print the whole width of the road section without wrap around).

```
40 IF A>20 THEN A=20
50 IF A<1 THEN A=1
```

We now need to place our obstacles on the road — as yellow ones should be nice and easy to see we'll use (CHR$(159)). Variable C will be a number from 0 to 31, inclusive and the obstacles will be placed by PRINT @. Make sure that you remember to include that semicolon after CHR$(159) or the road to the right of the obstacle will revert to green. It is essential to include the second PRINT @ statement in the line as this moves the print position down to the bottom right-hand corner of the screen so that the screen scrolls before it starts to print the next section of road.

```
110 C=RND(32)-1:PRINT @ (D+480),
    CHR$(159); :PRINT @ 511,""
```

One thing that you will soon notice is that the obstacles are not always printed on the road itself, but may appear anywhere on the screen. This is because C can be any number from 0 to 31 and therefore they can be printed on any column right across the screen.

This can be easily recitified if we make a new variable D (a random number from 0 to 11) and then add this to A which is the variable which already determines how far across the screen the road is placed, to give C instead. The limits for C are now from A to A+10, which must fall on the road.

```
110 D=RND(11)-1 : C=D+A : PRINT @
    (480+C),CHR$(159); : PRINT @
    511,""
```

The next stage is to put your car on the road! It is positioned near the centre of the screen by creating a new variable E (initial value 15), adding this to 224 (a print position near the centre of the screen), and then PRINTing an inverse U at that position to represent the car.

```
10 A=10 : E=15
110 D=RND(11)-1 : C=D+A : PRINT @
    (480+C),CHR$(159); : PRINT @
    (224+E), "u"; : PRINT @ 511,""
```

You will notice that the car leaves a trail behind it as it travels. To be able to wipe this out after each move, we need to remember the old value of E (the last position of the car) as the new variable L. Then, print a black space in the equivalent position on the line above — this will cover the old car as the screen scrolls. Note that it is on the line *above* the current car position that the trail must be blacked out, because the car actually stands still where it is positioned by PRINT @ while the road moves as the screen scrolls.

```
10 A=10 : E=15 : LP=15
110 D=RND(11)-1 : C=D+A : PRINT @
    (480)+C,CHR$(159); : PRINT @
    (192+LP),CHR$(128); : PRINT @
    (224+E),"u"; : PRINT @ 511,"" :
    LP=E
```

You should now have a winding black road with yellow obstacles on it, and a car which is sometimes on the road, but which more often than not is off. The next stage is to put the car under user control with the cursor keys.

It would be perfectly correct to use a series of IF-THEN checks for INKEY$ but a simpler and quicker way is to use the logical check in the line below.

```
70 B$+INKEY$ : IF B$="" THEN 100 E
   LSE F=ASC(B$) :
   E=E+((F=8)-(F=9))
```

Breakdown

This line is easier to understand if it is divided into parts for explanation:

B$=INKEY$:(Read INKEY$ into B$)

IF B$="" THEN 100

(If no key pressed jump on)

ELSE F=ASC(B$):

(If a key was pressed then set variable F to the ASCII value of that key)

E=E+((F=8)−(F=9))

(Increase (+1) or decrease (−1) the position of the car relative to the left side of the screen (E) according to whether the left arrow (F=8) or the right arrow (F=9) was pressed. This works because (F=8) and (F=9) will return either TRUE and a 1, or FALSE and a 0)

Left and right are not the only directions in which we can control movement. A simple way to provide a two-speed gearbox is to take advantage of the ability of the Dragon CPU to operate at 0.9 Mhz or 1.8 Mhz. The higher speed is obtained by POKE & HFFD7,0 and the lower speed by POKE &HFFD6,0. ►

◀ As the Dragon 32 was never designed to run at 1.8 MHz it is possible that your particular machine may not work correctly at the higher speed due to problems with the memory. But when it will work (which is most of the time in our experience) it is a very easy way to put two speeds into games.

You will notice that it also increases the frequency of the sounds produced, but you may not realise until too late that it also distorts the cassette load/save routines so that your recordings are useless, unless you make sure you switch back to low speed first.

This program automatically ends on low speed but if you stop it with the BREAK key you might still be in high speed. If you are not sure of the current situation always POKE &HFFD6,0 before attempting to load or save.

The spacebar is used to toggle between the two speeds by setting a marker variable M to indicate the speed status with M=0 being slow speed and M=1 being high speed. If the spacebar is pressed (F=32) and the CPU is at 0.9 MHz (M=0) then speed is increased and M set to 1. Similarly if M=1 the speed is decreased and M set to 0. In practice this means that if you hit the spacebar when you are in bottom gear you go up to top gear, and if you hit the spacebar when you are in top gear you go down to bottom gear.

```
80  IF F=32 AND M=0 THEN POKE
      &HFFD7 : M=1 : GOTO 100
90  IF F=32 AND M=1 THEN POKE
      &HFFD6,0 : M=0
```

Joysticks

The second method of control, which can be used very effectively here, is the joystick. The lever can be used for left and right movement and the joystick button to change gear. The line which controls direction must be changed to suit the joysticks but it is very similar in effect to the line used for key control.

```
70  JY=JOYSTK(0) :
      E=E+((JY<10)-(JY>50))
```

JY is the value of JOYSTK(0) (right joystick side to side axis) and E is the same as with key control. If JY is less than 10 then E is decremented and the car goes left and if JY is less than 50 then E is incremented and the car goes right.

To change speed substitute the joystick button PEEK check for spacebar detection.

```
80  IF PEEK(65280)=126 AND M=0
      THEN POKE &HFFD7,0 : M=1 :
      GOTO 100
90  IF PEEK(65280)=126 AND M=1
      THEN POKE &HFFD6,0 : M=0
```

You have probably realised by now that you can drive wherever you like! Although some people may prefer it like that, even they may want to know how many old ladies they have knocked down.

Once again we can PEEK at the screen to see what our situation is, with the easiest test being IF the square the car is about to move to is not black (CHR$(128)) then END.

```
100 IF PEEK(1024+224+E)<>128
      THEN END
```

```
 5 REM SET VARIABLES
10 A=10:E=15:L=E
15 REM PRINT ROAD SECTION
20 A$=STRING$(10,128):FOR N=1 TO
 16:PRINT TAB(10); A$:NEXTN:TIME
R=0
25 REM UPDATE
30 B=RND(3)-2:A=A+B:K=INT(TIMER/
50):J=J+1:IF K=>1200 THEN 400 EL
SE IF J=>1000 THEN 500
35 REM POSITION LIMIT CHECK
40 IF A>20 THEN A=20
50 IF A<1 THEN A=1
55 REM PRINT ROAD
60 PRINT TAB(A);A$;
65 REM MOVEMENT CHECK
70 B$=INKEY$:IF B$="" THEN 70 EL
SE F=ASC(B$):E=E+( (F=8)-(F=9))
75 REM GEARCHANGE
80 IF F=32 AND M=0 THEN POKE %HF
FD7,0:M=1:GOTO 100
90 IF F=32 AND M=1 THEN POKE &HF
FD6,0:M=0
95 REM COLLISION DETECTION
100 IF PEEK(1024+224+E)<>128 THE
N GOSUB 200
105 REM MAIN MOVEMENT
110 D=RND(11)-1:C=D+A:PRINT @ (4
80)+C,CHR$(159);:PRINT @ (192+L)
,CHR$(128);:PRINT @ (224+E),"u";
:PRINT @ 52,"T      D";:PRINT @
53, USING "####";K;:PRINT @59,US
ING "####";J;:PRINT @ 511, "";:P
LAY"T255;04;B"
120 GOTO 30
195 REM CHECK NEXT POSITION
200 H=PEEK(1024+224+E)
205 REM YELLOW
210 IF H=159 THEN I=I+1:SOUND 50
,1
215 REM OFF ROAD
220 IF H=96 THEN I=I+5:SOUND 100
,1
225 REM DAMAGE CHECK
230 IF I>=50 THEN 300
240 RETURN
295 REM EXCESS DAMAGE
300 CLS:PRINT"YOUR CAR HAS FALLE
N APART. YOU HAVE COVERED";K;"ME
TERS IN";J;"SECONDS":GOTO 1000
395 REM TIME UP
400 CLS:PRINT"OUT OF TIME. YOU T
RAVELLED ";J;" METERS":GOTO 1000
495 REM YOU WON
500 CLS:PRINT"YOU COMPLETED THE
DISTANCE OF 1000 METERS IN";J;"
SECONDS":GOTO 1000
995 REM RESET SPEED
1000 POKE &HFFD6,0
```

Full listing of the game — see text for details

A new problem has now arisen at the beginning of the game: before the screen starts to scroll the road does not reach to the centre of the screen, leaving the car stranded in the middle of a field and bringing the game to an end as soon as it starts. We therefore need to print some extra road sections at the start of the game on a 'once and for all' basis.

```
20  A$=STRING$(10,128) : FOR N=1 TO
      16 : PRINT TAB(10);A$ : NEXT IN
```

Now every time you hit an obstacle on the road, or you leave the road, the game ends. More interesting would be some way of accumulating damage to the car each time you hit something. We decided the best thing to do was to add 1 to a damage variable (DA) every time you hit a yellow block (CHR$(159)), and add 5 onto DA every time you hit green (CHR$(96)) by leaving the road. Notice that the green produced here where nothing is printed is CHR$(96) (a space), rather than the green graphic block which is CHR$(143).

Since things are getting rather more complicated it is best to put this part into a subroutine which is only reached if the character at the next print position is not black. Suitable audible warnings have also been included, and if your damage reaches 50 units the game comes to an end.

```
100 IF PEEK(1024+224+E)<>128
      THEN GOSUB 200
200 H=PEEK(1024+224+E)
210 IF H=159 THEN DA=DA+1 :
      SOUND 100,5
220 IF H=96 THEN DA=DA+5 : SOUND
      50,1
230 IF DA>=50 THEN 300
240 RETURN
300 END
```

So far the game only consists of driving down a road dodging obstacles, so why not consider the time taken and distance travelled? The TIMER is set to zero by TIMER=0 and the actual time read by the variable TI which is set to 1/50 of the TIMER count to give seconds. Distance travelled (DI) is incremented by 1 in each round. As we want time and distance printed in the top right hand corner of the screen with T and D placed over them in a set format PRINT USING is used.

Finally the PLAY command at the end sounds a very short note each time you move. Using PLAY allows you a shorter duration than the minimum SOUND value of 1, and therefore does not slow execution of the program so much.

```
20  A$STRING$(10,128) : FOR N=1 TO
      16 : PRINT TAB(10);A$ : NEXT N :
      TIME R=0
30  B=RND(3)-2 : A=A+B :
      TI=INT(TIMER/50) : DI=DI+1
110 D=RND(11)-1 : C=D+A : PRINT @
      (480)+C,CHR$(159); : PRINT @
      (192+LP),CHR$(128); : PRINT @
      (224+E),"u"; : PRINT @
      52,"T          D"; : PRINT @
      53,USING"####"; TI;: PRINT @
      59, USING"####" ;DI; : PRINT @
      511,"" : LP=E : PLAY"T255;04;B"
```

We still haven't given you a way of winning this game so let's look at two factors: time limit and distance travelled (damage to car has already been covered).

Winning (and losing)

First let's consider how to lose by running out of time. All we need to do is to add a check that some arbitrary time limit (1200 in this case) has not been reached.

```
30  B=RND(3)-2 : A=A+B :
      TI=INT(TIMER/50) : DI=DI+1 : IF
      TI=>1200 THEN 400
400 CLS : PRINT"OUT OF TIME. YOU
      TRAVELLED ";DI;" METRES" :
      GOTO 1000
```

The next possibility is winning by travelling the full distance of the road which is 1,000 metres (well we said it was hard, just wait till you see the size of the car!).

```
30  B=RND(3)-2 : A=A+B : TI =
      INT(TIMER/50) : DI=DI+1 : IF
      TI=>1200 THEN 400 ELSE IF
      DI=>1000 THEN 500
500 CLS : PRINT"YOU COMPLETED
      THE DISTANCE OF 1000 METRES
      IN";TI;" SECONDS" : GOTO 1000
```
■

GEM SOFTWARE

PROGRAMS FOR THE DRAGON 32

MONSTER MINE by W. E. MacGowan
Escape from the mine with as much money as you can, but don't get closed in or caught by the prowling monsters. An addictive machine code game, with superb graphics and save facility. Price **£7.95.**

GOLF by Pete Allen
Over 20K of Basic giving you full 18-hole golf course with handicaps, choice of clubs. Golfing weakness must be specified. Full colour graphics and sound, including score card. Price **£7.95.**

SPACE MISSION by W. E. MacGowan
Launch from lurlar base, flight your way through the asteriod belt to do battle with the enemy fleet. Multi-level space combat game, sets new standards in graphic excellence and attention to detail. Price **£7.95.**

CHARACTER GENERATOR by John Line
A program for the programmer, allowing creation and saving of character sets/shape tables and subsequent inclusion into users basic program. Demonstration program and full ASCII character set included. Price **£9.95.**

GAMES PACK I
SPACE WARS by John Line. A game for two scout ship pilots. SHEEPDOG by Erik Pattison. Pen the wayward sheep, if you can! TORPEDO by Erik Pattison. Sink the enemy fleet. SNAKE by Chris Hunt. Eat the food but not yourself. Price **£7.95.**

GAMES PACK II
LANDING by Peter Chase. A 3-part flight simulator. HANGMAN by Chris Hunt. The old favourite, with lots of words. SPEEDBOAT by Peter Chase. Hit the markers, but not the bank! BATTLESHIPS by C. Castle. A classic game, with a difference. Price **£7.95.**

GAMES PACK III
REVERSEI. Pit your wits against the Dragon with this easy to learn yet extremely demanding game. Five skill levels from novice to grand master. PONTOON. An excellent implementation of a favourite card game in full colour with sound. Dragon is a mean Banker. Price **£7.95.**

AND MANY, MANY MORE
Please write or phone for details. All available by mail order from:

GEM SOFTWARE
UNIT D, THE MALTINGS, SAWBRIDGEWORTH, HERTS
Telephone: (0279) 723567
TRADE ENQUIRIES WELCOME – PLEASE RING FOR DEALER PACK
Access orders welcome

DRAGON ★ DRAGON ★ DRAGON

HARDWARE

Dragon 32 with free Flight Simulator	£199.50
GP100A Printer 80 Col 30 CPS	£215.00
Star DP510 Printer 80 Col 100 CPS	£325.00
Star DP515 Printer 136 Col 100 CPS	£435.00
Joystick	£9.90
Printer Cable	£17.00
Cassette Lead, 7-pin Din to Jacks	£4.00
Video Switch, switch TV between computer/aerial (suits any computer)	£3.00
Dragon Dust Cover	£6.25

SOFTWARE

Program	Software House	Type	Price
Word Processor	Juniper Computing	Business	£17.25
Telewriter WP	Microdeal	Business	£49.95
Donkey King	Microdeal	Arcade	£7.95
Katerpillar	Microdeal	Arcade	£7.95
Talking Android Attack	Microdeal	Arcade	£7.95
Backgammon	Microdeal	Board Game	£7.95
Cosmic Zap	Microdeal	Arcade	£7.95
Galactic Ambush	Microdeal	Arcade	£7.95
Astro Blast	Dragon Data	Arcade	£19.95
Chess	Dragon Data	Board Game	£24.95
Road Runner	Dragon Data	Arcade	£19.95
Samurai Warrior	Lothlorian	Strategy	£6.95
Dragon Trek	Salamander		£9.95
Golf	Salamander		£7.95

This is a small sample of our total range, send for free list of complete range

All our prices are inclusive of VAT and delivery to UK mainland, we reserve the right to amend prices without notice

SEND CHEQUE/PO/ACCESS No. to

JUNIPER COMPUTING

8 PEMBROKE GREEN, LEA, MALMESBURY
WILTS SN16 9PB
Tel: 06662 2689

MONSTER SOFTWARE CLUB

SOFTWARE LIBRARY FOR THE DRAGON 32

OVER 70 TOP-QUALITY CASSETTES FOR HIRE. ALL TAPES USED WITH THE MANUFACTURERS PERMISSION
(WE PAY ROYALTIES)

ANNUAL MEMBERSHIP FEE £8.00
Tape hire **£1.50** per fortnight plus 40p p & p
(this includes a pre-paid return envelope)

SPECIAL TRIAL OFFER
3 months membership for just **£3.00**

PLEASE NOTE: Two tapes may be hired at the same time
Further tapes by return post

SAE for details

MONSTER SOFTWARE CLUB
32 LENNOX DRIVE, LUPSET PARK
WAKEFIELD, WEST YORKS

M & J SOFTWARE

DRAGON COMPANION BOOK **£4.95**
Study the workings of BASIC with the disassembler
Discover seven extra graphics modes
Take complete control of video memory mapping
Increase the processor speed (not a hardware mod)
Append programs from tape
Incorporate useful routines from BASIC in your machine programs
Add commands to BASIC

DRAGON IMPLEMENTATION OF FORTH **£10.00**
This is a cassette based implementation and is fully documented

FORTH LISTINGS **£7.00**
6502, 8080/Z80, 6809, 6800, 1802, 8086/8088, 68000 PDP 11 in stock

INSTALLATION MANUAL **£5.00**
Necessary for implementing FORTH and its editor

All prices inclusive of postage and packing
Cheques and POs made payable please to:

M & J SOFTWARE
34 Grays Close, Scholar Green, Stoke-on-Trent ST7 3LU
Tel: (0782) 517876
Dealer enquiries welcome

FOR A LOT OF FUN ON YOUR DRAGON JOIN OUR CLUB

Members' program listings, competitions, special offers, jokes and snippets of news and comments.

We have a vast selection of games, utility and business software . . . Over 100 titles currently in stock!

THE STATACOM TOP 10

Donkey King (Microdeal)	Wizard War (Salamander)
Planet Invasion (Microdeal)	Golf (Salamander)
Telewriter (Microdeal)	Pimania (Automata)
Strategic Command (Romik)	Chess (Dragon Data)
Warlord (Lothlorien)	Banking/Bank Rec. (Hilton)

Also: DEMON, DASM and DECODE from Compusense.

NEW TITLES: Cosmic Zap, Galactic Ambush, Talking Android Attack, Ring Of Darkness and more on the way!

PRINTERS: Oki Microlines a speciality, also Epsons & Seikoshas.

MONITORS: Primatel's Luxor colour monitor/TV (14").

ACCESSORIES: Printer/monitor cables, dust covers and "The Plug".

AMERICAN EXPRESS · DINERS CLUB

STATACOM LIMITED
234 HIGH STREET,
SUTTON, SURREY SM1 1NX
01-661 2266

Telephone/Mail Orders welcome.

Let Topsy take the strain from machine coding

***Pam D'Arcy** introduces Topsy, which promises an easier method of entering machine code.*

FOR THE NOVICE, machine code programming is daunting enough without the tedious business of converting hex values to decimal or prefacing hundreds of basic data statements with "&H".

This program allows you to enter the code as strings of hex with addresses in hex or decimal, leaving 12K for the actual program. Once loaded the code can be both saved and run using simple action codes.

The program came about by my wanting an easier method of entering machine code than having to convert hex values to decimal or having to preface every byte with "&H" for Basic DATA statements. However, like Topsy, "it grow'd" to include list routines, and EXECute facility and so on . . .

Flexibility

Topsy is much more flexible than for only machine code use. It enters machine code as hex strings without separators and relocates machine code to a lower load address. The standard powerful feature of the Dragon enables addresses to be input in either decimal or hex (preceded by "&H") format — as suits the circumstances of the moment.

Using Topsy, about 12K bytes is available for machine code programs (more if you omit REM and detailed screen instruction prints on entering the program). And there are no artificial machine code bounds — it is entirely under the user's control and can be altered during the program's operation.

Topsy allows facilities to be quitted (useful if you have accidentally asked for, say, the load or save facility) and limits writing to store to your specified reserved machine code area. This is for your safety as the Dragon hangs up if you attempt to write to Rom. When testing and writing to areas above Rom, I obviously corrupted something vital and lost — not once, but about four times — lengthy sets of applied program amendments. This was because I put the CSAVE facility out of action and hadn't saved the program prior to testing (I think I have learnt now).

Detailed descriptions on using the facilities are not described in this text as they can be read straight from the accompanying program listing, but a program synopsis may be useful.

To avoid confusion when entering the program, the letters I, O and U have not been used in variable names. Apart from the G numerics and the P and R string variables, other variables have single character names (the G, P and R variables have two character names). Variables J to R are string variables, all requiring the $ suffix; all others are numerics.

Understanding the G variables will assist you should you want to amend the constraints of the system or individual facilities within the system. These variables are initialised (subroutine lines 3370-3770) on initial entry to the program and after every memory reservation requested (action code V).

GA: Clear strings value — it is set to 650 in case any bright spark tries to find a program error by entering a full buffer of hex characters in one go. Experiment to find a suitable lower figure to match your needs. I only intend to enter an equivalent line of Assembler coding at any one time. If you are only interested in entering, say, a maximum of 25 bytes (50 characters) of hex in a single write entry, a setting of 250 is more than adequate, freeing an additional 400 bytes of store.

GB: Highest address to permit a write to — set to 32767 for reasons stated above.

GC: Current highest address available for use by the Basic program (= current lowest address reserved for machine code − 1).

GD. Calculated approximate highest address +1 that the currently loaded version of Topsy requires for the Basic program to run in.

GE – GV: Store bounds for the various facilities.

GY: The value that the string storage reservation is reset to at the end of the run — set to 200.

A list of facilities follows:

Action code V Optional Memory Reservation: Entered automatically at the start and end of a run when requested (often useful to refresh your memory of where you can use). It gives details of the current lowest reserved for machine code address and available space start address (lines 70-160).

Action code W Write Machine Code: Allows hex characters to be input as a plain character string. Requires two characters to be entered for each byte (being the most and least significant half-byte respectively) but needs no byte separating characters nor other hex overheads (Lines 400-850).

Action code S Save Machine Code: Experience shows that it is wise to save your hard machine code entry efforts prior to trying an initial trial in case of disaster. The save permits the machine code entry point to be specified as either the actual address (as is required by Basic) or as an offset, which may be more useful on occasion; Topsy then converts this to the actual address for the save (Lines 860-1180).

Action code X Execute machine Code: Allows any machine code currently in store to be executed (Lines 1380-1480).

Action code L Load machine code: Allows existing machine code programs (or data saved as a machine code file) to be loaded from cassette (Lines 1190-1370).

Re-saving

Action code C Copy store to store: As machine code programs cannot be loaded at a lower address than saved from (have you tried a negative offset?), this facility allows an existing (relocatable) machine code program to be loaded, copied to a lower address and re-saved from that lower address (Lines 1490-1630).

Action Codes H, D List store: Two useful facilities for checking hex strings written/moved in store — or for just browsing through memory. There is a hex listing (H) with 8 bytes to a line and a detailed listing (D) where each byte is displayed in hex, decimal and printable character format, one byte per line (Hex list: lines 1640-1900; Detailed list: lines 1910-2170).

End of run (Q on main menu): Closedown routine: lines 310-390.

Subroutines: Lines 2180 onwards are various subroutines, mainly printing of titles and instructions on using facilities. ▶

Entering machine code

```
10 REM TOPSY (C) PAM D'ARCY          MARCH 1983
20 REM program set up
30 REM initialise variables
40 GOSUB 3370
50 CLEAR GA
60 GOSUB 3370: REM reset vars
70 REM memory reservation
80 PB$="OPTIONAL MACHINE CODE AREA      RESERVATION"+PH$
90 REM o/p screen&get input A
100 GOSUB 3240
110 IF A = 0 THEN 160
120 IF A < GD                    OR A > GB                    THEN GO' !
B 2230: INPUT A:        GOTO 110
130 CLEAR GA,A
140 REM  reset cleared vars
150 GOSUB 3370
160 REM system initialised
170 REM main menu selection
180 GOSUB 3090: REM print
190 K$=INKEY$: IF K$ = ""        THEN 300
200 IF K$ = "W" THEN 400
210 IF K$ = "S" THEN 860
220 IF K$ = "L" THEN 1190
230 IF K$ = "X" THEN 1380
240 IF K$ = "C" THEN 1490
250 IF K$ = "H" THEN 1640
260 IF K$ = "D" THEN 1910
270 IF K$ = "V" THEN 70
280 IF K$ = "Q" THEN 310
290 GOSUB 2180: REM invalid inp
300 GOTO 190
310 REM quit program
320 PB$="RUN FINISHING"+PH$+"OPTIONAL RESET MEM RESERVATION"+PH$
330 REM o/p screen&get input A
340 GOSUB 3240
350 IF A = 0 THEN CLEAR GY:      GOTO 380
360 IF A < GD                    OR A > GB                    THEN GOS
UB 2230:          INPUT A: GOTO 350
370 CLEAR GY,A
380 REM exit
390 CLS: END
400 REM enter machine code         (write hex strings)
410 GOSUB 3060: REM title
420 GOSUB 3000: REM instrctns
430 PRINT PE$;: INPUT A
440 IF A = -1 THEN 170
450 IF A < GE                    OR A > GF                    THEN GOSUB
 2230: INPUT A:        GOTO 440
460 REM valid start address
470 PRINT
480 PRINT USING "#####";A;
490 PRINT " (";HEX$(A);")";
500 INPUT J$
510 IF J$ = "" THEN 750
520 B=LEN(J$)
530 IF B = 1 AND J$ = "-" OR     J$ = "Q" THEN 750
540 IF B/2 <> INT(B/2) THEN      PRINT "NOT ACCEPTED: ODD NUM CHARS     ";
GOTO 480
550 IF (B/2+A)-1 > GF THEN       PRINT "NOT ACCEPTED: WILL EXCEED MEMORY";
GOTO 480
560 REM string validation/        manipulation
570 M$=LEFT$(J$,1)
580 L$=MID$(J$,2,1)
590 B=B-2
600 IF B <> 0 THEN               J$=RIGHT$(J$,B)
610 IF M$ => "0" AND M$ <= "9"   THEN V=VAL(M$): GOTO 640
620 IF M$ < "A" OR M$ > "F"      THEN 840
630 V=ASC(M$)-55
640 V=V*16
650 IF L$ => "0" AND L$ <= "9"   THEN V=V+VAL(L$):             GOTO 680
660 IF L$ < "A" OR L$ > "F"      THEN 840
670 V=V+(ASC(L$)-55)
680 POKE A,V
690 A=A+1
700 IF B <> 0 THEN 560
710 REM no more chars
720 IF A <= GF THEN 480
730 PRINT "ACCEPTED BUT NO MORE MEMORY LEFTPRESS ANY KEY TO CONTINUE"
740 K$=INKEY$: IF K$ = ""        THEN 740
750 REM end of this entry phase
760 GOSUB 2960: REM next menu
770 K$=INKEY$: IF K$ = ""        THEN 770
780 IF K$ = "S" THEN 860
790 IF K$ = "X" THEN 1380
800 IF K$ = "W" THEN 400
810 IF K$ = "Q" THEN 170
820 GOSUB 2180:   REM invalid              action code
830 GOTO 770
840 REM invalid hex-char
850 PRINT "ACCEPTED AS FAR AS NON-HEX BYTE ": GOTO 480
860 REM save machine code
870 GOSUB 2920: REM title
880 GOSUB 2880: REM instructns
890 GOSUB 2850: REM input det
900 INPUT A,B,C
910 IF A = -1 THEN 170
920 IF A < GG THEN 1130
930 IF B < 1 OR C < 0 THEN 1130
940 IF (A+C) > GH THEN 1130
950 IF (A+B-1) > GH THEN 1130
960 REM valid values input
970 IF C < A                     THEN C=C+A
980 GOSUB 2790: REM instructns
990 PRINT "INPUT FILENAME(-1 TO QUIT):": INPUT N$
1000 IF N$ = "-1" THEN 170
1010 IF LEN(N$) > 8 THEN 1160
1020 CSAVEM N$,A,(A+B-1),C
1030 GOSUB 2700: REM next menu
1040 K$=INKEY$: IF K$ = ""       THEN 1040
1050 IF K$ = "R"                 THEN PRINT: PRINT "FILE ";N$;" BEING SAVE
D":                 GOTO 1020
1060 IF K$ = "F" THEN 990
1070 IF K$ = "S" THEN 860
1080 IF K$ = "X"                 THEN A=C: GOSUB 2480:         GOTO 14
1090 IF K$ = "W" THEN 400
1100 IF K$ = "Q" THEN 170
1110 GOSUB 2180: REM invalid act
1120 GOTO 1040
1130 REM invalid input1
1140 GOSUB 2230: INPUT A,B,C
1150 GOTO 910
1160 REM invalid input2
1170 GOSUB 2230: INPUT N$
1180 GOTO 1000
1190 REM load machine code file
1200 GOSUB 2660: REM title
1210 GOSUB 2600: REM instructns
1220 INPUT "INPUT FILENAME(-1 TO QUIT),      OFFSET";N$,C
1230 IF N$ = "-1" THEN 170
1240 IF LEN(N$) > 8 OR C < 0     OR C > GN                    THEN GOSU
B 2230:             INPUT N$,C:              GOTO 1230
1250 REM valid conditions
1260 PRINT: PRINT "SEARCHING FOR/LOADING FILE       ";N$
1270 CLOADM N$,C
1280 GOSUB 2520: REM menu
1290 K$=INKEY$: IF K$ = ""       THEN 1290
1300 IF K$ = "X"                 THEN A=0: GOSUB 2480:         GOTO 1440
1310 IF K$ = "S" THEN 860
1320 IF K$ = "C" THEN 1490
1330 IF K$ = "L" THEN 1190
1340 IF K$ = "N"                 THEN N$="": C=0:              GOTO 12
1350 IF K$ = "Q" THEN 170
1360 GOSUB 2180: REM invalid              code input
1370 GOTO 1290
1380 REM execute m/code
1390 GOSUB 2480: REM title
1400 GOSUB 2450: REM instructns
1410 INPUT "INPUT OPT START ADDR(-1 TO QUIT)";A
1420 IF A = -1 THEN 170
1430 IF A <> 0 AND A < GP        OR A > GO                    THEN Go
SUB 2230:                 INPUT A: GOTO 1420
1440 REM entered here from other          routines (PARAM A SET)
1450 PRINT PX$
1460 IF A = 0                    THEN EXEC                    ELSE
                 EXEC A
1470 PRINT: PRINT PY$
1480 GOTO 1410
1490 REM copy store to store
1500 GOSUB 2410: REM title
1510 GOSUB 2380: REM instructns
1520 GOSUB 2350: REM input det
1530 INPUT A,D,B
1540 IF A = -1 THEN 170
1550 IF A < 0 OR B < 1           OR A > GS                    OR D < GV
                 OR (D+B-1) > GT             THEN GOSUB 2230:
      INPUT A,D,B:  GOTO 1540
1560 REM valid copy
1570 FOR Y=0 TO B-1
1580 V=PEEK(A+Y)
1590 POKE(D+Y),V
1600 IF Y = 0 THEN               PRINT "FIRST BYTE OF COPY:";    PRINT HE
X$(A+Y);" TO ";          HEX$(D+Y),HEX$(V)
1610 NEXT Y
1620 PRINT "LAST  BYTE OF COPY:":    PRINT HEX$(A+Y-1);       " TO ";HEX$(D+Y-1
),HEX$(V)
1630 GOTO 1520
1640 REM list store (hex)
1650 PF$="HEX"
1660 GOSUB 2310: REM title
1670 PRINT PE$;: INPUT A
1680 IF A = -1 THEN170
1690 IF A < GK                   OR A > GL                    THEN GOSU
B 2230: INPUT A:        GOTO 1680
1700 CLS: PRINT: Z=0
1710 IF A < &H1000               THEN PRINT " ";
1720 IF A < &H100                THEN PRINT " ";
1730 IF A < &H10                 THEN PRINT " ";
1740 PRINT HEX$(A);"  ";
1750 FOR Y=0 TO 7
1760 V=PEEK(A+Y)
1770 IF V < 16                   THEN PRINT "0";
1780 PRINT HEX$(V);" ";
1790 IF A+Y = GL                 THEN PRINT: GOTO 1670
1800 NEXT Y
1810 PRINT
1820 Z=Z+1: A=A+8
1830 IF A > GL THEN 1670
```


```
1680 IF A = -1 THEN170
1690 IF A < GK                   OR A > GL                    THEN GOSU
B 2230: INPUT A:        GOTO 1680
1700 CLS: PRINT: Z=0
1710 IF A < &H1000               THEN PRINT " ";
1720 IF A < &H100                THEN PRINT " ";
1730 IF A < &H10                 THEN PRINT " ";
1740 PRINT HEX$(A);"  ";
1750 FOR Y=0 TO 7
1760 V=PEEK(A+Y)
1770 IF V < 16                   THEN PRINT "0";
1780 PRINT HEX$(V);" ";
1790 IF A+Y = GL                 THEN PRINT: GOTO 1670
1800 NEXT Y
1810 PRINT
1820 Z=Z+1: A=A+8
1830 IF A > GL THEN 1670
```


```
1840 IF Z < 12 THEN 1710
1850 REM  end of page
1860 GOSUB 2280: REM menu
1870 K$=INKEY$: IF K$ = ""       THEN 1870
1880 IF K$ = "Q" THEN 170
1890 IF K$ = LEFT$(PF$,1)        THEN 1670
1900 GOTO 1700
1910 REM list store (detailed)
1920 PF$ = "DETAILED"
1930 GOSUB 2310: REM title
1940 PRINT PE$;: INPUT A
1950 IF A = -1 THEN 170
1960 IF A < GK                   OR A > GL                    THEN GOSU
B 2230: INPUT A:        GOTO 1950
1970 CLS: PRINT "     ADDRESS    HEX DEC CHAR"
1980 Z=0
1990 V=PEEK(A)
2000 PRINT "  ";
2010 PRINT USING "#####";A;
2020 PRINT " (";HEX$(A);")";,;
2030 IF V < 16                   THEN PRINT "0";
2040 PRINT HEX$(V);"  ";
2050 PRINT USING "###";V;
2060 PRINT "  ";
2070 IF V = 13 THEN V=0;         REM print of 1f char           gener
es a line feed          while printing!
2080 PRINT CHR$(V)
2090 Z=Z+1; A=A+1
2100 IF A > GL THEN 1940
2110 IF Z < 12 THEN 1990
2120 REM end of page
2130 GOSUB 2280: REM menu
2140 K$=INKEY$: IF K$ = ""       THEN 2140
2150 IF K$ = "Q" THEN 170
2160 IF K$ = LEFT$(PF$,1)        THEN 1940
2170 GOTO 1970
2180 REM invalid menu input
2190 IF K$ = CHR$(13)            THEN K$="ENTER"
2200 PRINT @416,"KEY PRESSED:";K$
2210 GOSUB 2230
2220 RETURN
2230 REM print re-input line
2240 PRINT "INVALID ENTRY; RE-INPUT"
2250 RETURN
2260 REM titling/instructions
2270 REM listing titling
2280 REM end of page
2290 PRINT LEFT$(PF$,1)+"=DIFF ADDR;Q=QUIT;OTHER=CONT"
2300 RETURN
2310 REM list title
2320 CLS: PRINT "LIST STORE (";PF$;")"+PH$
2330 RETURN
2340 REM copy store titling
2350 REM input line details
2360 PRINT "INPUT SOURCE START ADDRESS     (-1 TO QUIT), DEST START ADDR,  LEN
TH:"
2370 RETURN
2380 REM instructions
2390 PRINT "AS NEG OFFSETS CANNOT BE USED   IN RELOCATING MACHINE CODE      DURI
NG FILE LOAD, THIS UTILITY  ALLOWS IN STORE RELOCATION      OF A MACHINE CODE PR
OGRAM FOR   A NEW SAVE WITH A LOWER LOAD    ADDRESS"+PH$
2400 RETURN
2410 REM title
2420 CLS: PRINT "COPY STORE TO STORE"+PH$
2430 RETURN
2440 REM execute m/code titling
2450 REM instructions
2460 PRINT "  IF NO ADDRESS GIVEN,WILL       OBEY NORMAL BASIC RULES         RE
 EXECUTION I.E. LAST          ONE EXEC'D OR CLOADM'D"+PH$
2470 RETURN
2480 REM title
2490 CLS: PRINT "EXECUTE MACHINE CODE"+PH$
2500 RETURN
2510 REM load m/code file
2520 REM file loaded/next
2530 CLS: PRINT "FILE ";N$;" LOADED"
2540 PRINT: PRINT PD$
2550 PRINT RX$ :PRINT RS$
2560 PRINT RC$: PRINT RL$
2570 PRINT "    LOAD NEXT PROG ON TAPE          (WITHOUT OFFSET)       N"
2580 PRINT RO$
2590 RETURN
2600 REM instructions
2610 PRINT "CHECK THAT THE TAPE & RECORDER  ARE READY FOR THE LOAD"
2620 PRINT
2630 PRINT "SEARCH/LOAD WILL START ON INPUT OF THE FILENAME AND OPTIONAL    (POS
ITIVE) OFFSET"
2640 PRINT
2650 RETURN
2660 REM title
2670 CLS: PRINT "LOAD MACHINE CODE FILE"+PH$
```

Continued on page 35

NEW



The Working Spectrum

A collection of sophisticated Basic programs and subroutines including Unifile, Renumber (handles Gotos and Gosubs) education, accounts, games and scores of essential routines. Put your Spectrum to work with what must be the most comprehensive Spectrum book. 248pp **£5.95***

The Working Commodore 64

Some of the more advanced programs in this collection include a word processor and text editor, a music and sound synthesiser, a sprite editor and a program which allows you to enter high resolution graphics mode. This is not available in the standard Basic. 160pp **£5.95**

The Working Dragon 32

This computer has capabilities far beyond most other computers in this price bracket. With this collection of Basic programs and routines David Lawrence introduces word processing, music and shows you how to mix text and high resolution graphics. As with the other books in this series, each program is built up out of re-useable subroutines. 160pp **£5.95***

New from Sunshine



Cruising on Broadway

Behind the wheel of your machine. **Cruising on Broadway.** You look mean. People stop to stare. Suddenly a black-and-white pulls onto the Broadway behind — its light flashing and siren wailing. The chase is on! **Cruising on Broadway** is a tyre-burning fast machine-code game for the 16 & 48K Spectrum. The further you can get the more difficult it becomes — cash prizes are being offered each month for the highest scores. **£4.95***

Blind Alley

A deadly duel, deep in space. **Blind Alley** is what passes for sport in the year 3017. Your craft must use strategy to out-wit and corral the opponent — in this crazy development of the pursuit games of the late 2600s. After each round in the enclosure game more players are sent against you to test your skill and agility. **Blind Alley** is the machine-code action of the future — now! For the 16 & 48K Spectrum. **Blind Alley** can be played with a Kempston Joystick. **£4.95***

Submit *your* program to Sunshine and your name could be here next month.

SUNSHINE

*Available through W.H. Smith's and computer dealers

Trade/dealer enquiries welcome

Please send me

- ☐ The Working Spectrum at £5.95 each
- ☐ Cruising on Broadway at £4.95 each
- ☐ Dragon User Magazine at £8 for 12 issues
- ☐ The Working Dragon 32 at £5.95 each
- ☐ Blind Alley at £4.95 each
- ☐ The Working Commodore 64 at £5.95 each

I enclose a cheque/ postal order for £ ______

payable to **Sunshine Books**
19 Whitcomb Street, London WC2 7HF

Name ______

Address ______

Signed ______

We can normally deliver in four to five days.

Entering machine code

```
2680 RETURN
2690 REM save m/code titling
2700 REM file saved/next
2710 CLS: PRINT "FILE ";N$;" SAVED"
2720 PRINT: PRINT PD$
2730 PRINT RT$
2740 PRINT "    SAVE (REPEAT SAME)      R"
2750 PRINT "    SAVE SAME BUT DIFF NAM F"
2760 PRINT RS$
2770 PRINT RD$
2780 RETURN
2790 REM record instructions
2800 PRINT "CHECK THAT THE TAPE & RECORDER  ARE READY FOR THE SAVE"
2810 PRINT
2820 PRINT "RECORDING WILL START ON INPUT OFTHE FILENAME"
2830 PRINT
2840 RETURN
2850 REM input line details
2860 PRINT "INPUT STORE START ADDRESS       (-1 TO QUIT),LENGTH,ENTRY POINT (AS
(POSITIVE) OFFSET OR ACTUAL ADDRESS);"
2870 RETURN
2880 REM instructions
2890 PRINT "ANY AREA OF STORE MAY BE SAVED. IT WILL BE WRITTEN TO TAPE AS IFA MA
CHINE CODE PROGRAM AND CAN  BE RETRIEVED AS SUCH"
2900 PRINT
2910 RETURN
2920 REM title
2930 CLS: PRINT "SAVE MACHINE CODE"+PH$
2940 RETURN
2950 REM enter m/code titling
2960 REM menu
2970 CLS:                          PRINT "IT IS RECOMMENDED TO SAVE CODE  PRIO
R TO EXECUTION":      PRINT
2980 PRINT PD$: PRINT RS$:         PRINT RX$: PRINT RW$:          PRINT RQ$
2990 RETURN
3000 REM instructions
3010 PRINT "  WHEN PROMPTED, KEY IN STRINGS   OF HEX CHARS (2 CHARS=1 BYTE)"
3020 PRINT
3030 PRINT "  END ENTRY PHASE BY ENTERING     EITHER 0 ALONE, A MINUS SIGN    AL
ONE OR PRESS ENTER ALONE"
3040 PRINT
3050 RETURN
3060 REM title
3070 CLS: PRINT "ENTER M/CODE (WRITE HEX STRINGS)"
3080 RETURN
3090 CLS
3100 PRINT " MACHINE CODE & UTILITIES MENU"
3110 PRINT " "+STRING$(30,"=")
3120 PRINT
3130 PRINT PD$
3140 PRINT RW$
3150 PRINT RS$
3160 PRINT RL$
3170 PRINT RX$
3180 PRINT RC$
3190 PRINT "    LIST STORE (HEX)       H"
3200 PRINT "    LIST STORE (DETAILED)  D"
3210 PRINT "    RESERVED AREA DETAIL   V"
3220 PRINT "    QUIT PROGRAM           Q"
3230 RETURN
3240 REM instructions & input              for memres
3250 CLS: PRINT PA$
3260 PRINT PB$
3270 PRINT "CURRENT RESERVATION STARTS AT"
3280 PRINT "       &H";HEX$(GC+1);" (";GC+1;")"
3290 PRINT
3300 REM for reservation only
3310 PRINT "AVAILABLE SPACE STARTS AT"
3320 PRINT "       &H";HEX$(GD);" (";(GD);")"
3330 PRINT
3340 REM input line detail
3350 INPUT "INPUT OPTIONAL NEW RESERVED     M/CODE AREA ADDRESS (ELSE PRESS ENTE
R ALONE)";A
3360 RETURN
3370 REM initialise variables
3380 REM mem res/reset
3390 GA=650
3400 GB=32767: REM dragon ram                          top address
3410 GC=(PEEK(39)*256)+(PEEK(40))
3420 REM approx lowest addr
3430 GD=GC-MEM+512:                 IF GD > GC                        THEN GC=G
D-1
3440 REM enter m/code
3450 GE=GC+1
3460 GF=32767
3470 REM save store
3480 GG=0
3490 GH=65535: REM top of dragon
3500 REM list store
3510 GK=0
3520 GL=GH
3530 REM load m/code
3540 GN=32767
3550 REM execute m/code
3560 GP=GC+1
3570 GQ=32767
3580 REM copy store
3590 GS=GH
3600 GT=32767
3610 GV=GC+1
3620 GY=200: REM reset string                      space to default
3630 PA$="MACHINE CODE & UTILITIES PROGRAM"+STRING$(32,"=")
3640 PD$="NEXT ACTION:                     CODE"
3650 PE$="INPUT START ADDRESS(-1 TO QUIT);"
3660 PF$="=DIFF ADDR;0=QUIT;OTHER=CONT"
3670 PH$=CHR$(13): REM line feed
3680 PX$="ENTERING M/CODE"+PH$
3690 PY$="RETURNED FROM M/CODE"+PH$
3700 RC$="    COPY STORE TO STORE     C"
3710 RW$="    WRITE   MACHINE CODE    W"
3720 RL$="    LOAD    MACHINE CODE    L"
3730 RS$="    SAVE    MACHINE CODE    S"
3740 RT$="    EXECUTE THIS M/CODE     X"
3750 RQ$="    QUIT THIS UTILITY       Q"
3760 RX$="    EXECUTE MACHINE CODE    X"
3770 RETURN
```

Dumping the screen content into the printer

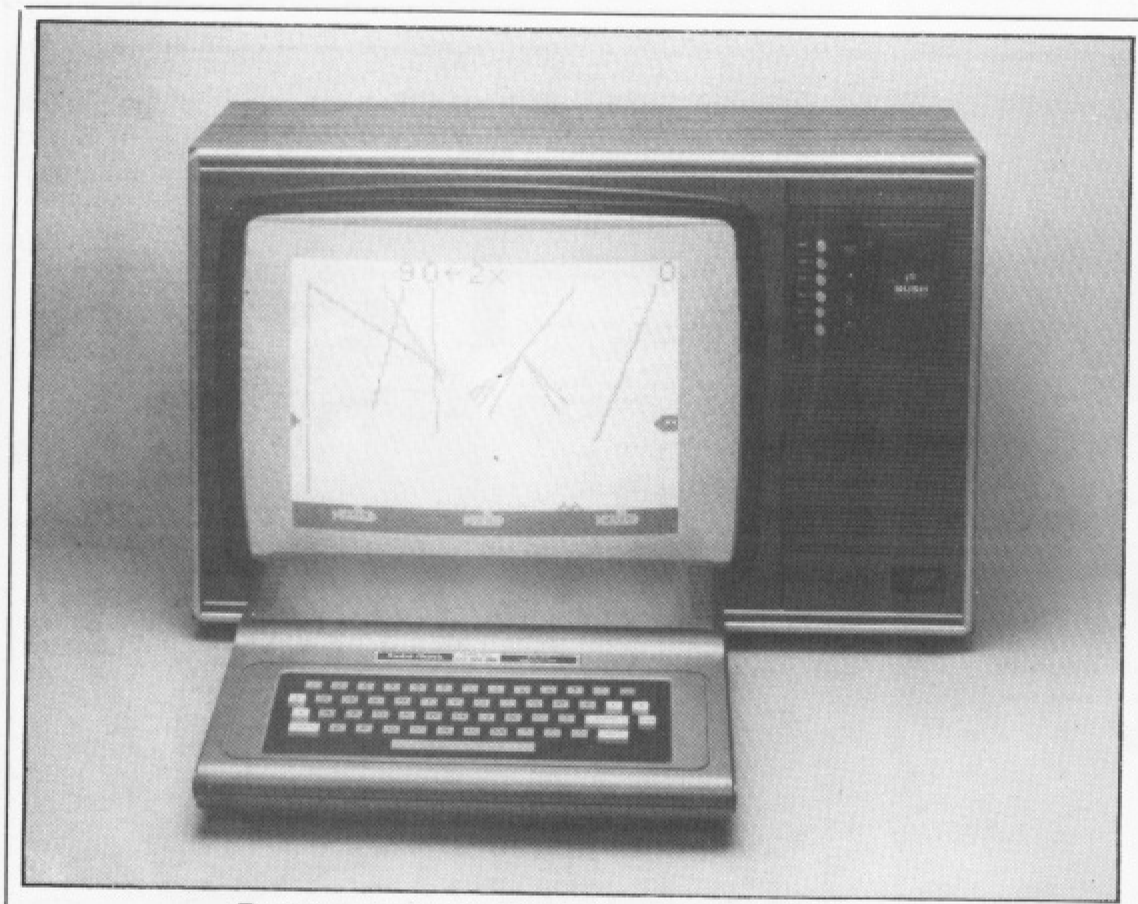
ONCE LOADED, this position independent 51 byte machine code program may be used by issuing an EXEC statement, either through the keyboard or from within a program. It dumps the entire current content of the screen to the line printer.

Obviously, should you wish the top line of a full screen to be printed, the EXEC call must be made from within a program, as input through the keyboard will scroll the top line off the screen. Very interestingly, my first efforts were thwarted by the fact that screen text characters, except for the caps range, differ somewhat from the ASCII codes.

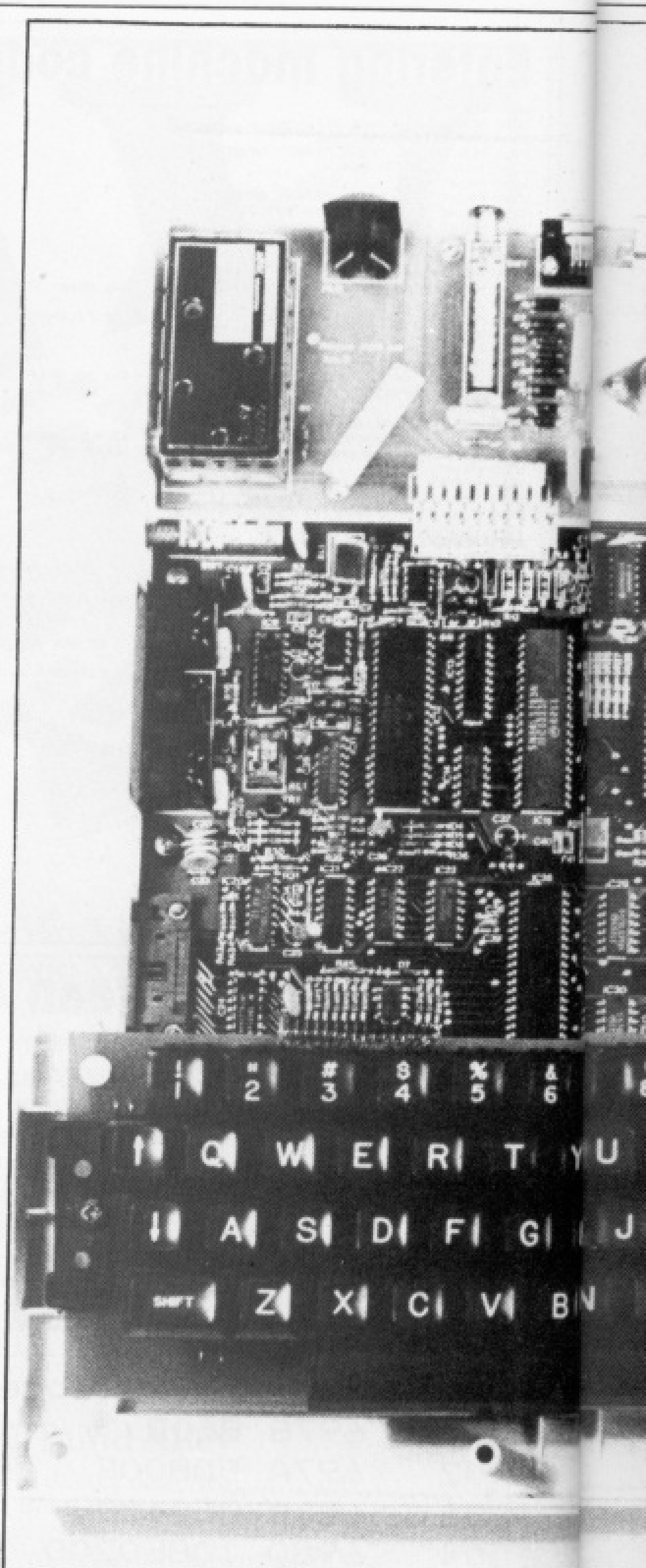
The program can be easily entered using the Topsy "write hex strings" facility (and be saved and tested). It can be entered at any "reserved for machine code" address in the machine — the uneven looking hex program start address on the listing arose because I entered the program through Topsy at address 27000!

The program as listed prints 32 characters to a print line. Should you wish to alter this to a 64-character print line (ie 2 screen lines per printer line), simply alter line 17 to ANDB #$3F (mc c43f).

```
line addr objectcode label     op                 comment
01   6978 860D       START     LDA   #$0D         start print with cr
02   697A BD800F               JSR   #$800F
03   697D 8E0400               LDX   #$0400       text screen address
04   6980 108E0200             LDY   #512         length of screen buf
05   6984 A680       NEXTCHAR  LDA   ,X+
06   6986 817F                 CMPA  #$7F         start graphics chrs-1
07   6988 220E                 BHI   PRINT
08   698A 8120                 CMPA  #$20
09   698C 2204                 BHI   NOTLOWER
10   698E 8A60                 ORA   #$60         correct print char
11   6990 2006                 BRA   PRINT
12   6992 8160       NOTLOWER  CMPA  #$60
13   6994 2502                 BLO   PRINT        cap char=ok
14   6996 84BF                 ANDA  #$BF         correct print char
15   6998 BD800F     PRINT     JSR   #$800F       output to printer
16   699B 1F10                 TFR   X,D          check for new line
17   699D C41F                 ANDB  #$1F         =addr/32
18   699F 2605                 BNE   DECCOUNT
19   69A1 860D                 LDA   #$0D         yes - do lf(cr)
20   69A3 BD800F               JSR   #$800F
21   69A6 313F       DECCOUNT  LEAY  -1,Y
22   69A8 26DA                 BNE   NEXTCHAR
23   69AA 39                   RTS                output complete
```



Tandy's Colour Computer (Coco) – based on the 6809 family



The most important difference between the tw

Same chips, but a different cup of Coco

*How alike are Tandy's Colour Computer and the Dragon? **George Saint** looks inside both to bring you the answer.*

A MYTH HAS developed about the Dragon's similarity to Tandy's Colour Computer. In fact the answer to the question "Is the Dragon the same as the Colour Tandy Computer?" is — "No!"

This needs qualifying, since there is a great deal of similarity between the machines, and approximately a 95 percent external similarity to the user. Unfortunately, it is the 5 percent difference that can cause all the problems to the unwary programmer — this article is concerned with highlighting the differences.

Hardware

Both the Dragon and the Coco (Colour Computer) are based on the Motorola 6809 family of chips. These are the 6809E CPU (Central Processing Unit), the MC6883 SAM (Synchronous Address Multiplexer), the MC6847 VDG (Video Display Generator) and the MC6821 PIA (Peripheral Interface Adapter). These four chips together with some Ram form a surprisingly powerful computer needing very few other electrical components — it is with this concept that Dragon Data and Tandy have designed their machines.

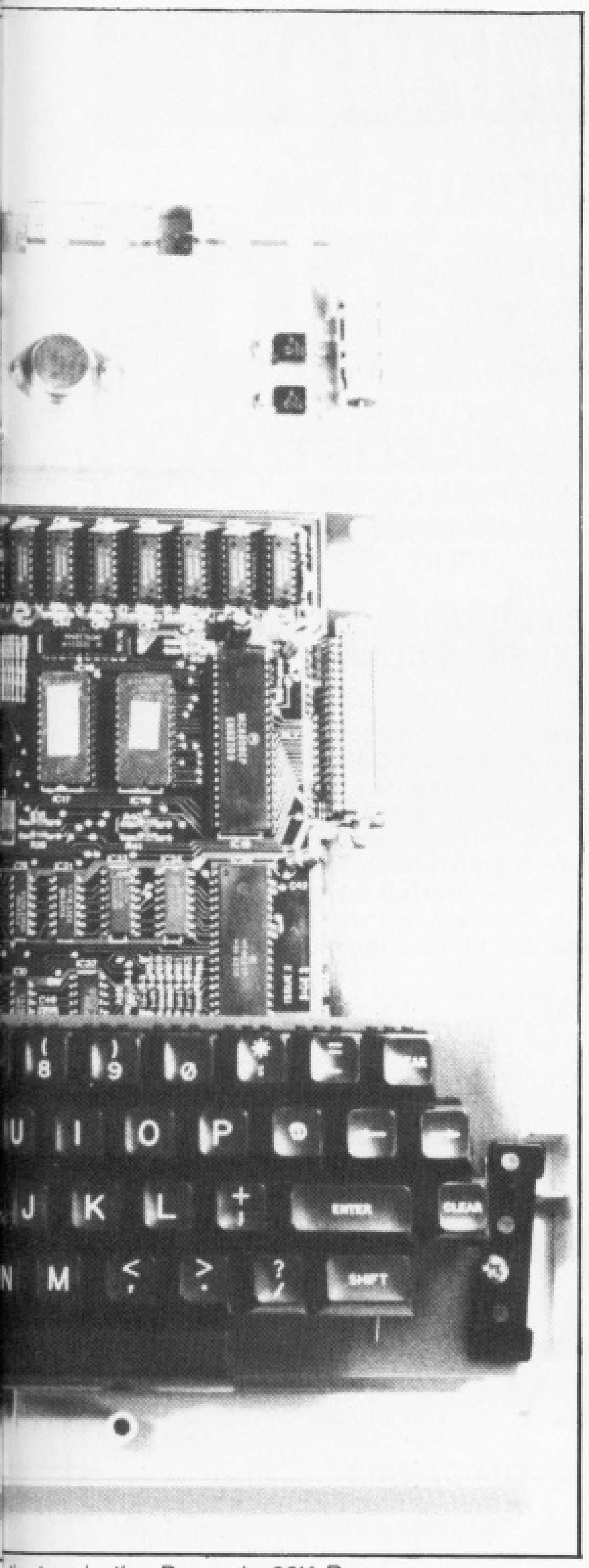
The fact that the 6809 chip is compatible with the earlier 6800 source code, and that new addressing modes are available to the programmer, makes it the most powerful 8-bit processor generally available on the market today. The speed of the CPU is about .89 MHz (Dragon Data has changed the external crystal oscillator from 14.31818 MHz in early machines to 14.218 MHz in later machines to improve picture quality). At this speed, the relative processor execution times compare very favourably with a 4 MHz Z80A-based computer system.

The 6809 chip is a half-way house to 16-bit machines, and offers program position independence (a program will execute properly when placed anywhere in the memory map), and true program re-entrancy (a subroutine can be shared by several tasks concurrently, without destroying the return address by nesting subroutines). This means that we can expect to see other high-level languages such as Pascal, Fortran and Cobol emerging on the expanded disc-based Dragons.

Pseudo colours

You may have wondered why on a colour computer, high resolution arcade games are offered in black and white, when a range of colours could be offered on a lower resolution with very little reduction in display quality. The very best arcade games are at the moment written in America for the Coco, and are converted to run on the Dragon. Unfortunately, our American cousins have an advantage over us in that they can generate pseudo colours (red, blue colour artefacts) in PMODE4 by placing the available colour pixels very close together to generate a pseudo colour on their television sets.

The catch is that the American TV



between the two is the Dragon's 32K Ram

operates at 525 lines, and can take its signal directly from the output of the VDG chip, whereas the English PAL television operates at 625 lines, so extra circuitry is needed to convert the signal. This effectively stops any pseudo colour generation and offers to us only the two-colour high resolution mode favoured by the American programmers.

This is a great pity, since some startling effects have been achieved with the colour artefacting. Both the Dragon and the Coco suffer from this problem, so is the better picture quality of the Coco due to a different circuit design for the 625 line conversion? I will leave the reader to make his own mind up on this.

The most important difference between the two machines for the Dragon user is the 32K of Ram which he gets with the machine, as opposed to the 4K or 16K Coco, together with the full extended Microsoft Colour Basic. The Coco can be upgraded to the 32K and the Extended Colour Basic, but by the time this is carried out, the price gap between the two machines gets even larger.

The best improvement over the Tandy machine is the provision of a parallel printer interface instead of a serial interface. This means that high speeds of printing can be carried out, and cheaper parallel printers can be used for this purpose. A serial port for the expansion slot will probably appear in the future, so those of you who want to transmit messages over the telephone line will not be disappointed.

The connections to the expansion slot are the same for both machines, so that it is possible to run Coco cartridges (if the software is compatible).

To sum up on the hardware side, the two machines are very similar, and the TRS-80 Colour Computer Technical Reference Manual will give a very close insight to the circuitry of the Dragon, although it must be kept in mind that there are changes and close scrutiny should be made to the circuit board if hardware modifications are attempted.

Both Dragon Data and Tandy have purchased the Microsoft Colour Basic Interpreter. This is the only colour Basic interpreter available at the moment for 6809 based computers, but both companies approached the installation of the Interpreter in a different way.

Tandy originally offered a non-extended Basic machine, where the interpreter resided in memory in the region A000 to BFFF (all addresses referred to here are in hexadecimal). As an optional (necessary!) extra, the extended Rom was offered for an additional sum of money, and this slotted into memory in the region 8000–9FFF. So that both Roms worked together, 'hooks' were written into the non-extended Rom which diverted flow to the direct page, and then to the extended Rom if it was present.

The first version of the Tandy Basic (1.0) suffered a bug in the joystick routine, so that when a joystick value was accessed, garbage appeared on the screen. The later version of the Rom (1.1) corrected this fault. If a disassembled listing of the Tandy Rom is examined, there is no free space available in the 16K for extra routines.

Dragon Data on the other hand provides the full 16K Extended Colour Basic as standard. Because the entire interpreter is supplied, the coding can be more compact than the Tandy version (although there are still the 'hooks' in the same places), and it resides in the same area of the memory map as the Coco Rom (8000–BFFF).

Unused space

But a disassembled listing shows an unused space from BE7F to BFF1 in the Dragon Rom and the internal routines are not all the same. A prime example of this is the keyboard scan routine.

You may have noticed that when you are typing fast, the Dragon may fail to pick up some of the letters you have typed. This will occur if a key in the same row is pressed too quickly. For example, if you press the @ key and then any other key in the range A-G quickly, you will find the second key will be missed. If you repeat the process, but press any other key outside the range @-G, everything will be okay.

This problem with the keyboard scan routine on the Dragon shows up when you are working in Basic, and use the INKEY$ scan command. A good number of programs for the Coco use the combination of SHIFT/CLEAR key to return a value of 5C (92 in decimal), where the unshifted value is 0C. If you run the following short program, you will find that only by judicious operation of both keys simultaneously can you return this value of 5C.

```
10 X$=INKEY:IF X$="" THEN 10
20 Y=ASC (X$):PRINT Y
30 GOTO 10
```

Faster games

This problem does not occur with the Coco because the keyboard scan routine is different, and operates more slowly. A useful spin-off is that games which are converted to the Dragon operate much faster.

Programs written in Basic will sometimes work on both machines, but the following points must be kept in mind:

1) To load a Colour Tandy Basic program and vice versa, it must first have been saved in ASCII format (eg CSAVE "GAME",A).

2) Do not write long lines of codes (no longer than 200 characters a line if possible), because the ASCII save can in varying circumstances truncate the expanded line, and ends of lines will be lost.

3) Coco machine code routines will very rarely work on the Dragon, so stay clear of Coco USR calls.

4) When making USR calls on the Dragon, you can define up to 10 USR routine addresses (DEFUSR 0-9) but the Dragon Rom has a bug in it and you can only access USR0. This means that X=USR5(0) will be interpreted as X=USR0(0). To get around this problem, define each call as USR0 just before making it, for example:

```
10 DEFUSR0=&H5000:X=USR0(0)
20 DEFUSR0=&H5002:X=USR0(0)
```

5) Keep clear of combining USR call and DEFFN. Strange errors can occur, and routines which work on the Coco will not necessarily work on the Dragon.

```
10 DEFFNA(X)=LEN(USR0(CHR$
  (121+16*X)))
20 A=FNA(2)
```

This example, when used with the correct machine code routine, will draw coloured border around the screen, but on the Dragon all you will get is an FC error.

6) Do not compact the coding of Basic programs by the removal of the blank spaces, as this can in certain circumstances generate errors. Both the Dragon and the Coco suffer from this problem, but it appears more prevalent on the Dragon. On other implementations of Microsoft Basic, removal of blank spaces does no harm, and programs are available to compact the code by this method, for example TRS80 level 2 Basic. ■

COMPUTASOLVE

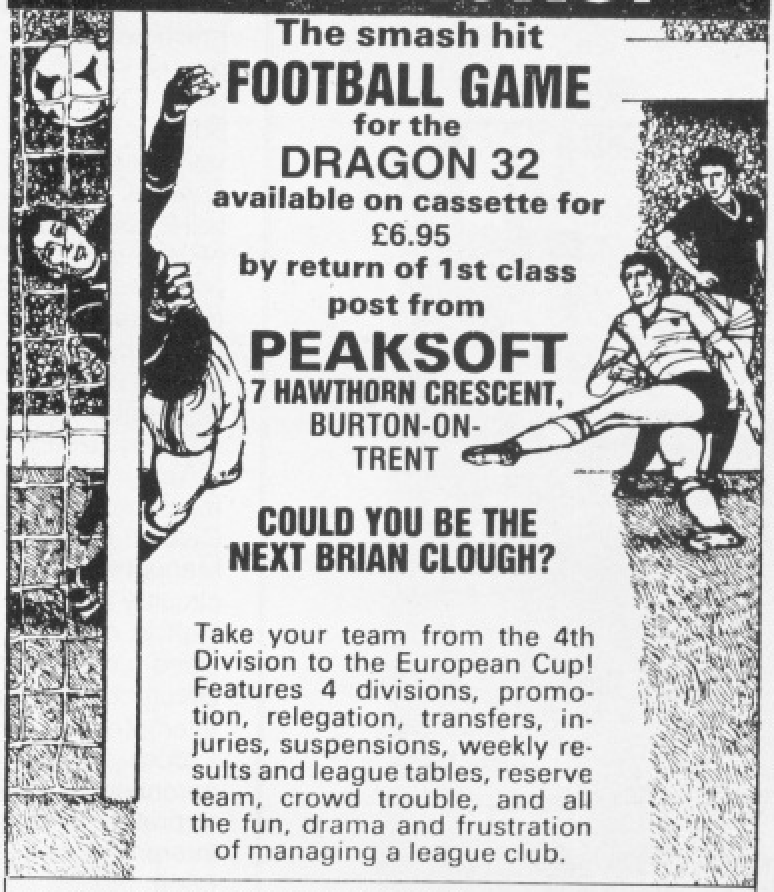
Diskdrives for the Dragon 32 available from stock; they are 100K capacity Full disc operating system

Ready to use

£299.00
including VAT

COMPUTASOLVE LTD
8 Central Parade, St Mark's Hill
Surbiton, Surrey. Tel: 01-390 5135

CHAMPIONS!



The smash hit
FOOTBALL GAME
for the
DRAGON 32
available on cassette for
£6.95
by return of 1st class post from
PEAKSOFT
7 HAWTHORN CRESCENT,
BURTON-ON-TRENT

COULD YOU BE THE NEXT BRIAN CLOUGH?

Take your team from the 4th Division to the European Cup! Features 4 divisions, promotion, relegation, transfers, injuries, suspensions, weekly results and league tables, reserve team, crowd trouble, and all the fun, drama and frustration of managing a league club.

Yes — please rush me Champioms! by return of post
Name..........
Address..........
....

Additional retail outlets for Champions! and our other great games welcome.

DRAGON SOFTWARE

FOR ALL THE FAMILY

FAMILY PROGRAMS . . . £6.95

- Strategic tank battle for 2 players.
- Educational maths quiz (3 levels).
- Guess the tune! (100 songs) 1/2 players.
- Comprehensive mortgage/savings calculator.
- Massive 750 question Quiz for 1/2 players.
- "Simon"-type memory game.
- "Day-of-week" calculator.
- Test your speed of reaction.
- "Chase the face" across the screen.
- Artists sketch pad.
- Thread the ring through the wire, 1-6 players.

FUN AND GAMES . . . £6.95

- Hi-res noughts and crosses (2 levels).
- Brain-teasing mastermind test.
- Race against time to collect the gold.
- Play card game, "Snap" against the Dragon.
- Unjumble the town name anagrams.
- Pin the tail to the donkey!
- Who can score the highest at poker dice.
- Pair up the coloured circles.
- Create and compare your computer art.
- Let the Dragon control your party games.

LIVE AND LEARN . . . £6.95

- Step-by-step tutorial, exploring the mysteries of High-resolution graphics.
- Facts and figures about favourite zoo animals with world map and a quiz.
- Educational tour of England, Scotland and Wales.
- Instructional quiz on towns and cities of Britain.
- How would you survive in a desert? Try the quiz, then learn the facts.
- Play your own tunes and learn about music notation.

What they said:

"Good value for money . . . professionally presented tapes." –*Which Micro and Software Review.*
"Well-thought-out programs, made better by professional presentation and full use of Dragon facilities." –*Popular Computing Weekly* (Fun and Games).
"Excellent for children's parties." –*Your Computer* (Fun and Games).
"Excellent value for money." –*Dragon's Teeth.*
"Good value package." –*Micro Software Club* (Family Programs).

CITY DEFENCE . . . £5.75

- Exciting missile command arcade game for joysticks. With good sound, colour and graphics.

QUIZ PACK . . . £3.95

- Two quiz games with over 500-word vocabulary including crossword puzzle generator with a facility for creating your own!

INFANT PACK . . . £3.95

- Pre-school education, learn the alphabet and simple counting with colour graphics and musical accompaniment.

ACTION PACK . . . £3.95

- Maze Game and Scorpion Attack

GENEROUS DEALER DISCOUNTS
— send now for Starter Pack offer

All cassettes carry a life-time replacement guarantee, are despatched within 48 hours and qualify you for future discounts.

SEND CHEQUES/POs to:
(Prices include P&P)

SHARDS SOFTWARE

At:
10 PARK VALE COURT
VINE WAY, BRENTWOOD
ESSEX CM14 4UR

OPEN FILE FOR DRAGON USERS

Send us your Dragon programs, beginning with a general description and then explaining how the program is constructed. Take care that the listings are all bug-free, enclosing a printout if possible. We pay £6 for each program published, double for the program of the month.

Duck Shoot

From Tony Smith in Milton Keynes

THE OBJECT OF the game is quite simple: you have to shoot the ducks swimming on the pond. However, you have to do it by inputting the angle of elevation of the barrel, so that the bullet flies up and then falls on the unsuspecting duck.

All you have to do to fire is type in the barrel's angle of elevation. The computer does the rest by plotting the projectile's path.

As the gun used is double-barrelled, you have two shots at each duck. The number of shots you have had, and the number of ducks hit, are shown as dots at the top of the screen. The letters are written by use of the Dragon's DRAW command, as is the misfire message, The ducks are positioned on a random basis, and use the GET and PUT commands, rather than redraw the duck each time.

The program makes use of the Dragon's high resolution graphics, and uses the PLAY command for a rendition of the Death March, every time a duck is hit.

Program notes

Lines	
150-410	Set up the picture, and input the angle, from which the parabola of the trajectory is drawn.
420-460	Draw the misfire message.
470-560	Tell you if you've shot yourself, or run out of ammunition.
570-610	PUT the ducks at a random position on the pond.
620-680	Deal with the end of the duck if it is hit.
690-750	Are the title sequence.
760-850	Print the instructions.
8500-8640	Plot the score of ducks hit, and the number of shots had.
9000-9070	DRAW the score words.
9500-9570	GET the duck shape and draws the first duck.

The program takes up approximately 8K of the Dragon's memory.

```
10 REM*****DUCK SHOOT*****
20 REM***(C) A.SMITH******
30 REM****10/2/1983*******
40 CLEAR 500
50 T$="duck shoot"
60 M$="T255;V31;ABFGBAABGFBA":F=0
70 A=1
80 GOTO 690
90 PRINT @ 42,"DUCK SHOOT"
100 PRINT @ 74,"=========="
110 PRINT @ 256,"INSTRUCTIONS?"
120 INPUT "YES OR NO";Y$
130 IF LEFT$(Y$,1)="Y" THEN 760
140 FOR I=1 TO 1000:NEXT I
150 REM***SET UP SCREEN*****
160 PMODE 4,1:SCREEN1,1:COLOR0,5
170 PCLS
180 LINE(0,180)-(256,192),PSET,BF
190 IF F=0 THEN GOSUB 9500 ELSE GOSUB 570
200 GOSUB 9000
210 GOSUB 8500
220 GOSUB 8600
230 REM***INPUT ANGLE AND DRAW PARABOLA****
240 A$=INKEY$:IF A$="" THEN 240
250 B$=INKEY$:IF B$="" THEN 250
260 A$=A$+B$:A=VAL(A$)
270 IF A=90 THEN 470
280 IF A>87 OR A<10 THEN 420
290 FOR I=0 TO 200
300 Y=INT((I*(200-I)/213)+0.5)
310 X=INT(I*(90-A)/100)
320 X=X*3:Y=Y*3
330 IF Y<0  THEN Y=0
340 IF X>256 THEN X=256
350 IF X>V+3 AND X<V+30 AND Y<6 THEN 620
360 PSET(X,180-Y,0)
370 NEXT I
380 G=G+1
390 S$=S$+"1"
395 GOSUB 8500
396 GOSUB 8600
400 IF G=2 THEN 170
410 GOTO 230
420 REM***MISFIRE****
430 DRAW"BM220,12;C0S4;U7F3E3D7"
440 FOR I=1 TO 1000:NEXT I
450 DRAW"BM220,12;C5S4;U7F3E3D7"
460 GOTO 400
470 REM***SHOT YOURSELF***
480 CLS
490 PRINT @ 128,"OH DEAR!! YOU HAVE SHOT YOURSELF!!"
500 PRINT @ 256,"PRESS 'ENTER' TO PLAY AGAIN"
510 Y$=INKEY$:IF Y$="" THEN 510
520 IF Y$=CHR$(13) THEN RUN ELSE END
530 REM***OUT OF AMMO*****
540 CLS
550 PRINT @ 128,"HARD LUCK!! YOU ARE OUT OF AMMUNITION!!"
560 GOTO 500
570 REM****OTHER DUCKS****
580 V=INT(RND(220))
590 IF V<40 THEN V=40
600 PUT(V,160)-(V+30,180),DU,PSET
610 RETURN
620 REM***DEATH OF A DUCK****
630 K$=K$+".":S$=S$+"."
640 FOR I=1 TO 20 STEP 1.5
650 CIRCLE(V+15,180-H),I,0
660 NEXT I
670 PLAY"O1V31T2L4GGL8GGL4B-AAGGF+G"
680 GOTO 170
690 REM***TITLES****
700 CLS
710 FOR X=73 TO 403 STEP 33:PLAY M$
720 PRINT @ X,CHR$(143+32);:NEXT X:FOR I=1 TO 100:NEXT I
730 FOR X=73 TO 403 STEP 33:PLAY M$:PRINT @ X,MID$(T$,A,1)
740 A=A+1:NEXT X:FOR I=1 TO 100:NEXT I:CLS
750 GOTO 90
760 REM****INSTRUCTIONS*****
770 CLS:PRINT @ 10,"INSTRUCTIONS"
780 PRINT @ 32,"THE IDEA IS TO HIT AS MANY DUCKS"
790 PRINT"AS POSSIBLE. YOUR GUN IS POSITO-"
800 PRINT"NED AT THE BOTTOMN LEFT-HAND CO-"
810 PRINT"RNER OF THE SCREEN. YOU SIMPLY "
820 PRINT"TYPE IN THE ANGLE OF ELEVATION"
830 PRINT"(IF IT IS OVER 87 AND UNDER 10"
840 PRINT"AN M APPEARS TO SHOW A MISFIRE)"
850 PRINT"PRESS 'ENTER' TO START":INPUT Y$: GOTO 140
8500 REM***DOTS FOR DUCKS HIT***
8510 FOR I=1 TO LEN(K$)
8520 IF LEN(K$)=0 THEN RETURN
8530 PSET((I*4)+35,10,0)
8540 NEXT I:RETURN
8600 REM***DOTS FOR SHOTS****
8610 FOR I=1 TO LEN(S$)
8615 IF LEN(S$)=0 THEN RETURN
8620 IF LEN(S$)=55 THEN 530
8630 PSET((I*4)+35,25,0)
8640 NEXT I:RETURN
9000 REM****DU+SH******
9010 DRAW"BM5,5;C0S4;R5F2D3G2L5U7"
9020 DRAW"BM15,5;C0S4;D5F2R3E2U5"
9030 DRAW"BM25,8;C0S4;R5C5D2L1C0L5"
9040 DRAW"BM12,20;S4C0;L5G2D1R5F2D2L7"
9050 DRAW"BM15,20;C0S4;D7U3R7D3U7"
9060 DRAW"BM25,23;C0S4;R5C5D2L1C0L5"
9070 RETURN
9500 REM****FIRST DUCK*****
9510 DIM DU(30,30)
9520 DRAW"BM210,180;S4C0;U5L4U2R6U2R2D5R10U1R1D5"
9560 GET(200,160)-(230,180),DU,G
9570 F=1:V=200:RETURN
```

Quilt

From J. Hilton of St Agnes

LINE 20 SETS all the colours available in the low resolution mode in a random order on the 61 × 31 grid. As the colours build up it is gradually transformed into the 16 × 32 grid. Run it for a while.

```
 5 REM COLOURFUL QUILT
10 CLSO
20 SET(RND(63),RND(31), RND(8))
30 GOTO 20
```

Machine code loading

From J. Burford of Hawkley Hall Farm

THIS PROGRAM IS designed to load the Dragon 32 direct from the hex dump without having to convert the hex dump into decimal first. It can put values into any available memory space by changing the values of A.

The amount of data must equal the number of memory locations accessed. After inserting all data correctly program can be run. When OK prompt appears, delete all this program. Then access machine code program as normal.

```
10 FOR A = 1540 TO 1549 : READ B$
20 L = ASC(LEFT$(B$,1)) : R = ASC(RIGHT$(B$,1))
30 IF L = 65 OR L = 66 OR L = 67 OR L = 68 OR L =
   69 OR L = 70 THEN L = L - 55 ELSE L = L - 48
40 IF R = 65 OR R = 66 OR R = 67 OR R = 68 OR R
   = 69 OR R = 70 THEN R = R - 55 ELSE R = R
   - 48
50 T = L * 16 + R
60 POKE A,T
70 NEXT
80 DATA FF,EE,DD,01,BE,67,0B,
   C0,9A,3B
```

Program notes

Lines	
10	Sets up memory accessed. Reads hex value.
20	Splits hex into powers (L = 16^1 and R = 16^0). Returns the ASCII code.
30 & 40	Checks if L and R = A to F and adjusts accordingly.
50	Converts to decimal.
60	Pokes memory location with decimal value.
70	Repeats for next memory location.
80	Start of data statements.

Brainbox

From Paul Yeandle in Poole

BRAINBOX IS THE familiar logic game which has taken many forms over the centuries. You are required to guess the exact pattern of concealed colours. In fact, this version for the Dragon 32 selects any five colours from eight, in order, and gives you 12 guesses in which to discover that hidden pattern. Any colour may be repeated as many times as the processor' random number generator decides.

The colours used are the eight natural colours of the Dragon and, consequently, a black background is necessary.

Unlike many computers which have keys already marked with colour names, the Dragon is lacking. I have taped a small piece of card above the 1 to 8 keys on my machine, carrying coloured squares as follows:

1 = green	5 = buff/white
2 = yellow	6 = cyan/light blue
3 = blue (dark)	7 = magenta/mauve
4 = red	8 = orange

This facility can obviously then be used in other programs. It is actually an improvement on other machines which show only the colour names and not the colours.

To play the game, the player presses five colour keys resulting in five coloured squares appearing in a vertical line on the screen. When all five have been selected, the program responds with an assessment of the guess.

At the foot of the screen, for each colour guessed correctly in its right position, a black square appears. For each other colour guessed correctly but in the wrong position, a white square appears. After several guesses, if the player receives five white squares, he knows he has the correct colours but that some are in the wrong positions.

After 12 unsuccessful attempts, the program displays the hidden pattern. This pattern can be displayed at any time should the player wish to concede, simply by pressing the ? key. This key was used since it requires the shift key also to be depressed and is therefore unlikely to be touched accidentally.

Arrays

- G Colour codes of the guess.
- M Colour codes of the hidden line.
- R Indicators showing which positions have been counted for black squares, ie which colours are guessed in the correct positions.
- W Indicators showing which positions have been counted for white squares, ie which colours are correctly guessed but in a different position from that in the hidden line.

Variables

- A$ Multipurpose in setting up the screen and accepting guesses from the keyboard.
- B$ Blanks used for masking parts of the screen display.
- C Number of colours from which to select (eight).
- J Loop count (one to five)
- K Loop count (one to five)
- M Number of attempts before the solution is revealed (one to 12).
- P Position on screen for the next black/white assessment square.
- R Number of colours in one line guessed in their correct position.
- S Number of colours selected (five).

To reduce the difficulty of the problem, the colours could be reduced to say six and the number selected to four by altering lines 530, 700 and 810 — clearly the instructions would need to be changed also if this was permanent (110 and 170).

Lines	
300	Preliminaries and instructions.
310-520	Setting up the screen.
530	Set number of colours and selections.
570-590	Computer chooses random line.
600	The 12 attempts.
610-630	Reset indicators for the next guess.
640	Set screen position for next assessment square.
650-710	Accept colour selection, checking for a correct line and marking those colours in their correct positions.
715	Print the appropriate number of black squares.
720-830	Count the number of colours not already marked which are correct but not in their right positions — white for each.
860-940	End position or if conceding — display hidden line.
950-999	Invite further games.
1000-end	Delay subroutine.

Program listed on page 42

```
10 ' *** BRAINBOX  ***
20 ' ***    BY     ***
30 ' *** P.YEANDLE ***
40 ' ***   POOLE   ***
50 ' ***    (C)    ***
60 ' ***************
70 DIM R(10),W(10),M(10),G(6)
80 CLS 3
90 PRINT @76,"BRAINBOX";
100 PRINT @ 128,"YOU HAVE TO GUESS THE HIDDEN"
110 PRINT "PATTERN OF 5 COLOURS CHOSEN FROM 8"
120 PRINT @ 256,"YOU HAVE 12 TRIES TO GUESS  THE CORRECT ARRANGEMENT"
130 PRINT @ 352,"ANY COLOUR MAY BE REPEATED ANY  NUMBER OF TIMES"
140 GOSUB 1000
150 CLS 0
160 PRINT @ 32,"THE COLOURS YOU MAY CHOSE ARE "
170 FOR C=1TO8
180 : PRINT @ 64+C*32,CHR$(127+16*C);
190 : PRINT @ 68+C*32,C;
200 NEXT C
210 PRINT @ 352, "THE NUMBERS REPRESENT THE KEYS"
220 PRINT "YOU MUST PRESS TO CHOOSE THAT COLOUR"
230 GOSUB 1000
240 CLS 7
250 PRINT @ 64,"AT THE FOOT OF THE SCREEN, YOU"
260 PRINT "WILL BE GIVEN AN ASSESSMENT OF"
270 PRINT "HOW GOOD IS YOUR GUESS TO THE   HIDDEN LINE"
280 PRINT @ 224,CHR$(128);" MEANS A COLOUR IS IN THE RIGHT   PLACE"
290 PRINT @ 320,CHR$(207);" MEANS A CORRECT COLOUR HAS"
300 PRINT "  BEEN CHOSEN BUT IT IS IN THE   WRONG POSITION"
310 GOSUB 1000
315 A$="":CLS 0
320 '
330 ' *** SET UP THE SCREEN ***
340 '
350 FOR R=0 TO 28
360 : A$=A$+CHR$(131)
370 NEXT R
380 PRINT @ 291,A$;S$="                             "
390 FOR L=0 TO 4
400 :  PRINT @ L*64,CHR$(65+L)+CHR$(128)+CHR$(138);
410 :  PRINT @ L*64+34,CHR$(138);
420 :  PRINT @ L*64+26,CHR$(133);
430 :  PRINT @ L*64+58,CHR$(133);
440 :  IF L<>4 THEN PRINT @ 354+L*32,S$; ELSE PRINT @ 482,LEFT$(S$,25);
450 NEXT L
455 PRINT @ 290 ,CHR$(139);:PRINT @ 314,CHR$(135);
460 PRINT @ 59,"BRAIN";
470 PRINT @ 124,"BOX";
480 PRINT @ 155,LEFT$(A$,5);
490 PRINT @ 379,"PRESS";
500 PRINT @ 413,"?";
510 PRINT @ 444,"TO";
520 PRINT @ 475,"STOP";
530 C=8:S=5:B$=""
540 '
550 ' *** START ***
560 '
570 FOR R=1 TO 5
580 : M(R)=RND(C):B$=B$+CHR$(128)
590 NEXT R
600 FOR M=1 TO 12
610 : FOR K=1 TO S
620 :    R(K)=0:W(K)=0
```

Continued on page 44



Are your finances driving you mad?

Do you find that working out your finances makes your head buzz? Do you see red?
Don't worry, now you can have Hilton's **Personal Banking System** on your side, giving you a clear head start and (hopefully) putting you back into the black!
Maintain permanent records and fully detailed statements of your finances including:
★ **All** cheque book transactions and bank receipts
★ **All** standing order payments **Automatically Processed** (monthly, quarterly, six-monthly or annually **and** for set number of payments)

In addition the ability to search, locate, delete or correct previous entries. List by category facility is included. Additional **Bank Reconciliation** module available to automatically match your Bank Statement to your **Personal Banking System** account.
Full instructions included and **guaranteed** after sales maintenance provided.

★ **PBS ZX81 £8.95 (16K)**
★ **ZX SPECTRUM £9.95 (48K)**
★ **DRAGON £9.95 (32K)**
Bank reconciliation (for use with above) £5.

Ask for the PBS at your local computerstore, ORDER by POST (specifying machine) OR at the POST OFFICE using TRANSCASH ACCOUNT 302 9557

HILTON COMPUTER SERVICES

Hilton Computer Services Ltd (Dept XX) 14 Avalon Road, Orpington, Kent BR6 9AX

★ YOUR PBS IS NEVER OUT OF DATE ★

FIRST TIME ADVERTISED IN STOCK NOW

- Lazer Cycles
- Mission Dru
- Hangman
- Breakout

All on one cassette only £6.95 including p&p

Test your skill
Challenge your friends
Orders sent by return of post

Lasersound Software Ltd

Unit 004
Stretford Workshops
Burford Road
London E15

Telephone 01-519 0791
01-519 7809

DEALER/EXPORT ENQUIRIES WELCOME

PROGRAMS WANTED — 30% OR CASH

Dragontree Programs

TANGRAMS
The ancient Chinese pastime. 50 problems to solve plus your own creativity.

BOWLING
1-4 can play this realistic interpretation of tenpin bowling. (Needs joystick)

REVERSI. Can you defeat your Dragon?

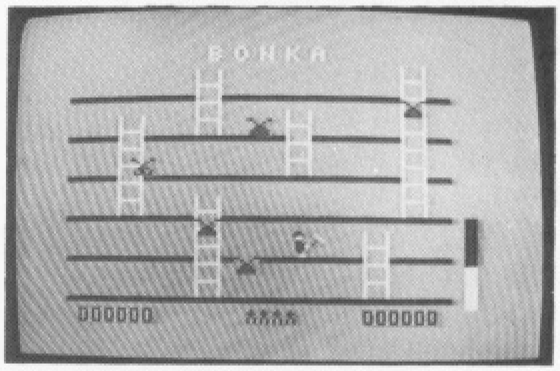
All cassettes **£4.95** inclusive

Make cheques payable to:

COPPICE SOFTWARE

7 March Street, Kirton in Lindsey, Gainsborough, Lincs DN21 4PH

BONKA FOR DRAGON 32



Action-packed MACHINE CODE Arcade game, using superbly animated HI-RES **COLOUR** GRAPHICS AND SOUND.
Chase up and down ladders luring homicidal Meanies into holes dug with your space hammer. When you trap one, rush over and BONK him on the head. But hurry! If you loiter he will climb out and fill in the hole. The slightest touch from a Meanie and you are electrocuted.
Just to add to your problems, your OXYGEN is running out.

FEATURES INCLUDE:
4 different screen layouts.
Score and Hi-Score counter displayed on screen. "Hall of Fame" high score record. Four selectable speeds and up to nine Meanies to start. More points scored for more levels Meanies fall. NO JOYSTICKS NEEDED.

SOLD ON CASSETTE £7.95
PRICE INCLUDES VAT, POST & PACKING.

Cheques and POs payable to
J. MORRISON (MICROS) LTD
2 Glensdale Street, Leeds,
Yorkshire LS9 9JJ. Tel: (0532) 480987
Callers welcome.
Other software available for Dragon.
Send SAE for details.

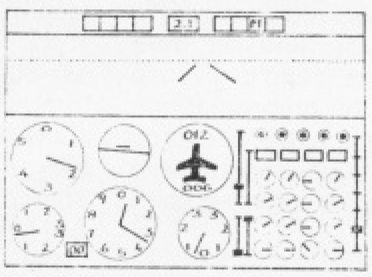


J. MORRISON (MICROS)

DRAGON/32 BBC MODEL/B TRS80 C/C 32K

747 FLIGHT SIMULATOR

Superbly realistic instrumentation and pilot's view in lifelike simulation which includes emergencies such as engine fires and systems failures. This program uses high resolution graphics to the full to produce the most realistic flight-deck display yet seen on a home computer. There are 21 real dials and 25 other indicators (see diagram). Your controls operate throttle, ailerons, elevators, flaps, slats, spoilers, landing gear, reverse thrust, brakes, etc. You see the runway in true perspective. Uses joysticks and includes options to start with take-off or random landing approach. "A real simulation, not just another game" *(Your computer April 19 '83).*



Cassette £9.95 (pp and VAT included):

D.A.C.C. Ltd. (Dept. D.U.)

23 Waverley Road, Hindley, Greater Manchester WN2 3BN.

```
630  : NEXT K
640  : P=353+M*2:R=0
650  : FOR K=1 TO S
660  :    A$=INKEY$:IF A$="" THEN 650
670  :    IF A$="?" THEN M=12:GOTO 860
680  :    IF A$<"1" OR A$>CHR$(C) THEN 650
685  :    G(K)=ASC(A$)-48
690  :    PRINT @ K*64-63+M*2,CHR$(127+16*G(K));
695  :    IF G(K)=M(K) THEN R=R+1:R(K)=1 ELSE R(K)=0
700  :    IF R=5 THEN PRINT @ 347, "WELL ";:PRINT @ 379, "DONE ";:GOTO 900
710  : NEXT K
715  : IF R>0 THEN PRINT @ P,CHR$(128);:P=P+32:R=R-1:GOTO 715
720  : FOR K=1 TO S
730  :    IF R(K)=1 THEN 830
740  :    FOR J=1 TO S
750  :      IF J=K THEN 820
760  :      IF R(J)=1 THEN 820
770  :      IF G(K)<>M(K) THEN 820
780  :      IF W(J)=1 THEN 820
790  :      W(J)=1
800  :      PRINT @ P,CHR$(207);:P=P+32
810  :      J=5
820  :    NEXT J
830  : NEXT K
840  : R=0
850 NEXT M
860 IF A$<>"?" THEN 910
870 PRINT @ 347 , "HARD ";
880 PRINT @ 379,"LUCK ";
890 FOR K=0 TO 2
895 : PRINT @ K*32+411, "      ";
900 NEXT K
910 FOR K=1 TO S
920 : PRINT @ 64*K-37,LEFT$(B$,2)+CHR$(M(K)*16+127)+LEFT$(B$,2);
930 : PRINT @ 64*K-5,B$;
940 NEXT K
950 PRINT @ 411,"PLAY ";
960 PRINT @ 443,"AGAIN";
970 PRINT @ 475,"Y/N ?";
980 A$=INKEY$:IF A$="" THEN 980
990 IF A$="Y" THEN CLS 0:GOTO 315
995 CLS 7:PRINT @ 224,"       THANKS FOR PLAYING":END
999 '
1000 ' *** WAIT ***
1010 '
1020 PRINT @ 450, "PRESS SPACE BAR TO CONTINUE";
1030 A$=INKEY$:IF A$<>" " THEN 1030
1040 RETURN
```

Machine clock

From Ian Nicholson on Merseyside

HOW MANY TIMES have you glanced at your watch after staring at a flashing cursor for hours on end, only to find that you have missed your favourite tv programme? Well now you can change all that with this program for a real timer. You get a permanent on-screen display in hours, minutes and seconds, which will even run while any Basic program is running.

The program, written completely in machine code, must be entered from locations 512 to 599. The listing is given in hex to help you follow the program if you know anything about machine code. You can enter it directly into your Dragon with a hex monitor, or by using the following short program:

```
10 FOR I=512 TO 599
20 PRINT I ;
30 INPUT P: POKE I, P
40 NEXT
```

You must not forget to precede each number with "&H" to let the computer know you are dealing with hex numbers. Enter the numbers carefully — any mistake will have disastrous effects.

As it stands the program will still not run, as the control system does not pass through it. You must alter the jump address at 010D. Since the Basic interpreter passes through this address, any attempt to change it using "POKE" will crash the system.

Fortunately a short machine code routine will do the job:

```
15000 CC
15001 02
15002 00
15003 FD
```

```
15004 01
15005 0D
15006 39
```

Having entered this in a similar manner to the main program type in the following: EXEC 15000: CSAVEM " TIME I.N " ,256,599,343

Your clock should appear and start running. If you load the program from tape using CLOADM it will run immediately on loading without typing in any additional commands.

512	86	523	97	534	84	545	5C	556	8E	567	F7	578	70	589	40
513	02	524	08	535	A6	546	C1	557	02	568	4F	579	70	590	02
514	1F	525	5F	536	84	547	05	558	4A	569	1F	580	7A	591	44
515	8B	526	8E	537	A1	548	26	559	A6	570	8B	581	A2	592	02
516	B6	527	02	538	A0	549	EF	560	B1	571	7E	582	7A	593	41
517	01	528	3E	539	26	550	0C	561	A7	572	9D	583	76	594	02
518	13	529	10	540	0B	551	43	562	82	573	3D	584	7A	595	42
519	81	530	8E	541	86	552	8E	563	8C	574	70	585	76	596	02
520	00	531	02	542	70	553	04	564	04	575	70	586	02	597	44
521	27	532	45	543	A7	554	1E	565	17	576	70	587	3F	598	02
522	1D	533	6C	544	80	555	10	566	26	577	70	588	02	599	43

Millipede

From Keith Hunniford in Antrim in Northern Ireland

MILLIPEDE IS A fast graphics game in which you are a millipede and to get home you have to cross a flowerbed, scattered with deadly slug pellets. Left and right arrow keys are used for movement and the scoring is based on how many steps you take. Your score is displayed at the end of the game and every 100 points gained the slug pellets become closer together.

Program notes

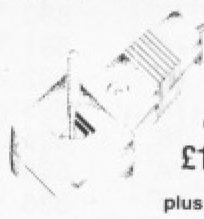
Lines	
10-30	Credits.
40-140	Instructions.
150	Sets up variables.
170	Prints millipede (note inverse V).
180	Increases score.
190-200	Calculate distance between pellets.
220	Checks to see if millipede bumps into pellet.
230-240	Auto repeat keyboard scan.
250-260	Keep millipede on screen.
280-300	Change slug pellet positions and keep slug pellets on screen.
310-350	Score, etc.

```
                    MILLIPEDE
10 '-----------------------------
20 'BY KEITH HUNNIFORD
30 '-----------------------------
40 CLS
50 PRINTTAB(5);"YOU ARE A MILLIPEDE"
60 PRINTTAB(5);"YOU HAVE TO CROSS "
70 PRINT TAB(5);"THE ROSE BED"
80 PRINT
90 PRINT"beware of the. "
100 PRINT
110 PRINTTAB(10);"slug pellets**+??##"
120 PRINTTAB(10)"<-MOVEMENT->"
130 FOR X=1 TO3:PLAY"T10GEGFFEE":NEXTX
140 CLS 1
150 A=10:P=490:B=1
160 PLAY"T255L255O5C"
170 PRINT@A+256,"-v-";
180 B=B+1
190 D=ABS(10-(B/100))
200 IF D<5 THEN D=5
210 PRINT@P,CHR$(159);:PRINT@P+D,CHR$(159);:PRINT@511," ";
220 IF PEEK(1024+257+A)=159 THEN GOTO320
230 IFPEEK(343)=223 THEN A=A-1
240 IF PEEK(344)=223 THEN A=A+1
250 IF A=<0 THENA=0
260 IF A>29 THEN A=29
270 F=RND(2)
280 IF F=1 THEN P=P-1:ELSE P=P+1
290 IFP<482 THENP=482
300 IF P+D>510 THEN P=500
310 GOTO160
320 PRINT"YOU ATE a slug pellet"
330 PRINT"you are dead"
340 PRINT"       YOU GOT ";B;" STEPS                ACROSS THE FLOWER BED"
350 PLAY"T2L201T5GEGFFEE":GOTO140
```

Classified

For Classified Advertising Rates please ring Simon Langston on 01-930 3840

DRAGON 32 JOYSTICKS



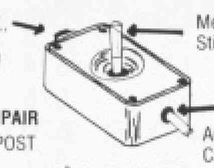
ONLY
£14.95
plus 75p p&p

Top quality, easy to handle joysticks, for the enthusiastic games player.

Available from
CASCOM
67 ELSTOW ROAD, BEDFORD MK42 9NT

TALON

DRAGON/TANDY JOYSTICKS



£15 PAIR
INCL POST

EXTENSION LEADS
First Metre £2 and £1/m thereafter
104 Woodbridge Rd, Rushmere St Andrew, Ipswich, Suffolk IP4 5RA

DRAGON 32 MERGE PROGRAMS

Programs can be fully merged on the Dragon 32. For full details and instructions send £1 plus sae to **G. Grimwood, 'Allenwoods', 105 Conway Road, Colwyn Bay, Clwyd.**

DRAGON SOFTWARE

£8 membership plus **£1** per tape
Dust cover colour matching and Dragon motif **£3.25**
RS232 serial interfaced now available
Modem (users RSS 232) available soon
Epson MX Graphic screen dump listing only **£2.50**

Cotswold Computers
Parkhill Hook Norton
Banbury Oxon
Tel: 0608 737472

DRAGON ACCOUNTING SYSTEM

includes

* Trial Balance
* Profit and Loss Account
* Current Balances
* Balance Enquiry
* Account Code Enquiry (max. 300 accounts)

Only £4.00
N. VAN BRADDER
72 Berry Hill Lane, Mansfield, Notts.

TERMINAL SOFTWARE

LINE UP 4 — Our first program for the Dragon 32 — a machine code brain teaser
Only £4.95!
From all good dealers or by mail order from
TERMINAL SOFTWARE, Dept. DU, 28 Church Lane, Prestwich, Manchester M25 5AJ
★★Dealer enquiries welcome★★
★★Machine code programmers!!!★★
We will offer up to £1,000 for good, original programs for any of the popular micros.

RAM PAGE

CHARACTER GENERATOR — Lower case, user defined graphics, mixed hi-res text, definable scrolling window, all text sent to hi-res screen but may be cleared **leaving graphics intact even if over written.**
Includes free auto repeat £8.00
Also **Disassembler £5.00, Flight Simulator £7.50,** soon **speech synthesiser.**
Cash - Cheque - Transcash 31 003 0404
32 Birchwood Drive, Wilmington, Dartford, Kent PA2 7NE

Help your child to learn on your Dragon with our exciting new
EDUCATIONAL PROGRAMS
Only £4.95 each

Tables Tutor Multiplication practice for ages 7 to 11 years
Spelling Tutor Improve your spelling, for ages 9 to 99 years

Fun to use, with full colour and sound. Available on cassette at only £4.95 each.
Cheque/PO to:
Micro-DeBug Consultancy
60 Sir John's Road, Selly Park
Birmingham B29 7ER
Many other subjects available, send SAE

DRAGON GAMES

Startrek III **£7**; Luna Lander **£4**; Dragonslayer **£9**; Hound **£6**; Typerite **£4**; 3-D Designer **£5**; Crayon **£5.50.**
SAE and 50p for Catalogue
SAINT GEORGE SOFTWARE (DU)
73 Ling Street, Liverpool 7

DRAGON 32 PRINTING SERVICE

Send your program on cassette (which we will return) with printer listings for £2.

R.R. COMPUTER SERVICES
2a FRITHWOOD AVENUE
NORTHWOOD, MIDDLESEX

KOPIKAT

TRS80 and Dragon Owners. Protect your valuable tapes by making a back-up copy using our Kopikat tapes which will copy most double or single loaded tapes £15 inc. p&p. Write to:

KOPIKAT
2 Bell Lane, Narborough, Leics.

WEST DEVON ELECTRONICS
Horrabridge, Devon
Tel: Yelverton (0822) 853434

Dragon 32 £200 plus free games tape. Printer including Dragon cable and taper. **£249**
Diskdrives for Dragon 32.
Free mail order delivery, open some evenings, but phone first.
Official Dragon appointed service centre.

Here's my classified ad.

(Please write your copy in capital letters on the lines below.)

£0.20	£0.40	£0.60	£0.80
£1.00	£1.20	£1.40	£1.60
£1.80	£2.00	£2.20	£2.40
£2.60	£2.80	£3.00	£3.20
£3.40	£3.60	£3.80	£4.00
£4.20	£4.40	Please continue on a separate sheet of paper	

I make this.............................. words, at 20p per word so I owe you £..............................

Name..

Address..

....

....

Telephone..

Please cut out and send this form to: Classified Department, *Dragon User*, Hobhouse Court, 19 Whitcomb Street, London WC2

Musical Dragon

From Roger Walton in Bury St Edmunds

A SHORT MUSICAL program for the Dragon which uses an auto repeat key routine to enable tunes to be played at the Dragon keyboard.

Program notes

Lines	
10-20	Instructions.
30	Sets up array for recording tune.
40	Sets processor to high speed.
50-160	Check keyboard and play notes or commence replay.
170	Allows second key to function before first is released.
190	Tune replay routine.
200	Resets processor to normal speed.

```
10 CLS:PRINT@39,"**MUSICAL DRAGON**"
20 PRINT@130,"PLAY YOUR TUNE USING LETTERS   A-K ON THE KEYBOARD. YOUR TUNE  IS
AUTOMATICALLY RECORDED-JUST   PRESS R TO REPLAY
30 DIM P(1000):C=0
40 POKE&HFFD7,0
50 IF PEEK(337)=255 THEN 50
60 C=C+1
70 A$=CHR$(PEEK(135))
80 IF A$="A"THEN SOUND 89,1:N=89
90 IF A$="S"THEN SOUND 107,1:N=107
100 IF A$="D"THEN SOUND 124,1:N=124
110 IF A$="F"THEN SOUND 130,1:N=130
120 IF A$="G"THEN SOUND 144,1:N=144
130 IF A$="H"THEN SOUND 156,1:N=156
140 IF A$="J"THEN SOUND 168,1:N=168
150 IF A$="K"THEN SOUND 175,1:N=175
160 P(C)=N:IF A$="R"THEN 190
170 POKE 337,191
180 GOTO50
190 FOR I=1 TO C:SOUND P(I),1:FOR Z=1TO30:NEXT Z:NEXT I
200 POKE&HFFD6,0
```

Sine waves

From F G Holliman of Harrogate

THE PRINCIPLE THAT any wave can be regarded as the sum of a series of sine waves of different frequencies, amplitudes and phases is of very great importance.

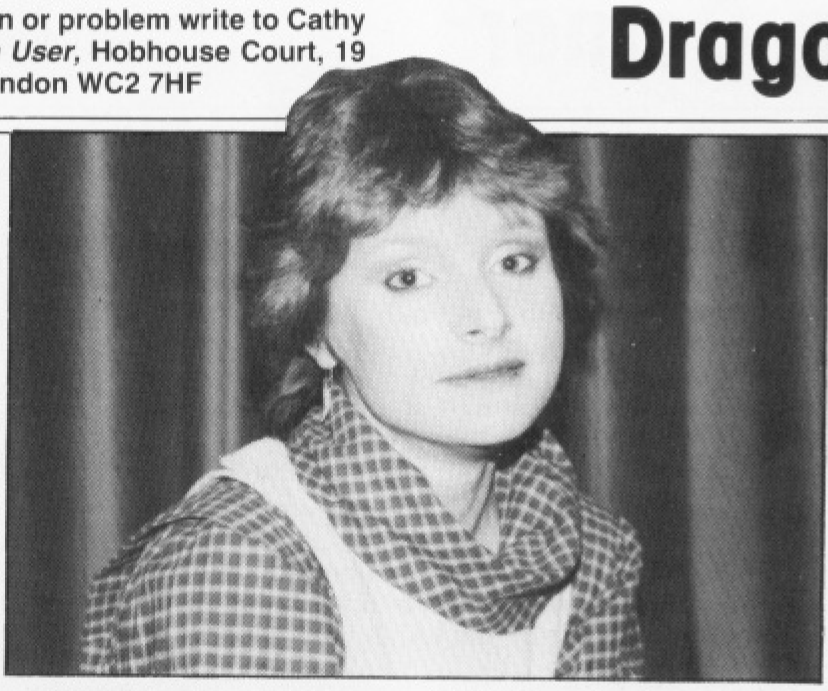
In this program, parameters are entered for individual waves (130) which are calculated (180) and displayed (190). The loop 310-360 generates the sum of the waves: for each X, Y for each wave is recalculated (320), summed (330), proportioned to scale (340) and displayed (350).

Try, for example, building up a square wave by summing a wave and its odd-numbered harmonics in different proportions.

```
1 REM**************************
2 REM SINE WAVE ADDITION
3 REM**************************
4 REM  BY F.G.HOLLIMAN 3/83·
5 REM**************************
10 CLS:PRINT@33,"sine waves and their addition"
20 PRINT@96,"THIS PROGRAM SHOWS THE EFFECT OF"
30 PRINT@128,"ADDING SINE WAVES WITH DIFFERENT"
40 PRINT@161,"FREQUENCY,AMPLITUDE AND PHASE"
50 PRINT@194,"AS IN THE TONES OF DIFFERENT"
60 PRINT@235,"INSTRUMENTS"
70 FOR D=1 TO 5000:NEXT D
80 N=0:Y=0:A=0
90 CLS:N=N+1:PRINT @32,"ENTER FREQUENCY IN ROTATIONS PER"
100 PRINT@64,"SCREEN WIDTH,AMPLITUDE AS"
110 PRINT@96,"A FRACTION OF HALF SCREEN HEIGHT"
120 PRINT@128,"AND PHASE DIFFERENCE IN DEGREES"
130 PRINT@160,"FOR WAVE NUMBER";N;:INPUT F(N):INPUT A(N):INPUT P(N)
140 FOR D=1 TO 200:NEXT D:CLS
150 PMODE4,1:SCREEN1,1
160 LINE-(0,96),PRESET
170 FOR X=0 TO 255
180 Y(N)=96-96*A(N)*SIN(X*6.286*F(N)/256+P(N)/57.296)
190 LINE-(X,Y(N)),PSET
200 NEXT X
210 FOR D=1 TO 5000:NEXT D:PCLS
220 PRINT@32,"ANOTHER WAVE?";:INPUT A$
230 IF LEFT$(A$,1)="Y" GOTO 90
240 PRINT@64,"THE SUM OF THE";N;" WAVES ENTERED"
250 PRINT @96,"WITH THE FOLLOWING PARAMETERS"
260 FOR M=1 TO N:PRINT F(M),A(M),P(M):NEXT M
270 PRINT"WILL NOW BE PLOTTED AMPLITUDE"
280 PRINT"SCALED TO HALF SCREEN HEIGHT"
290 FOR D=1 TO 5000:NEXT D:CLS
300 PMODE4,1:SCREEN1,1:LINE-(0,96),PRESET
310 FOR X=0 TO 255:Y=0:A=0:FOR M=1 TO N
320 Y(M)=A(M)*SIN(X*6.286*F(M)/256+P(M)/57.296)
330 Y=Y+Y(M):A=A+A(M):NEXT M
340 YS=96-96*Y/A
350 LINE -(X,YS),PSET
360 NEXT X
370 FOR D=1 TO 5000:NEXT D
380 PCLS: PRINT "ANOTHER DISPLAY?":INPUT A$
390 IF LEFT$(A$,1)="Y" THEN 300
400 PRINT :PRINT "ANOTHER SET?":INPUT A$
410 IF LEFT$(A$,1)="Y" GOTO 80
420 END
```

If you've got a technical question or problem write to Cathy Hyde, Dragon Answers, *Dragon User,* Hobhouse Court, 19 Whitcomb Street, London WC2 7HF

Dragon Answers



Errors identified

WHILE I was attempting to convert and key in a Sharp program into my Dragon 32, I accidentally came across a new Dragon error code. This new error code, which was displayed on my screen, was UF error.

When seeing this unfamiliar error code I immediately attempted to look it up in my manual, but after discovering it was not there, I decided that you might be able to help. Can you?

Andrew Pidgeon,
Haverhill,
Suffolk.

THE UF error you have encountered is an Undefined Function error. This occurs when you call up a function that does not exist. For example, if you have a line A = FNS (variable) and have not already defined the function in a DEF FNS statement you will get this error.

The other error code which is not covered in the manual is a DN error, this being a Device Number error, which will occur if you call up a device which is not linked up. For example, PRINT #−3 will give you a DN error as no such device exists on your Dragon at present.

Dragon Club opens

I HAVE a Dragon 32 which I purchased in February this year. As part of the package enclosed with the computer was the guarantee. On the bottom edge of this card were the words: "Every purchaser of a Dragon 32 computer will be made a free member for 12 months of the Dragon Club."

Since I sent off the guarantee some four weeks ago I've heard nothing. My question is: "Is this another of those 'get your money' and forget the purchaser deals we hear about so much?"

J. Jones,
Wigan,
Lancs.

THIS IS not another of those "get your money" deals and you should have now received your first issue of the *Stop Press* newsletter from Dragon Data. There were. unfortunately, delays with the first issue.

Users who returned their warranty card before the date of release of *Stop Press* will still have one year's free subscription, starting from the first issue of *Stop Press* rather than the date of the warranty card. Users who have not yet received *Stop Press* should contact Dragon Data with details and proof of purchase and they should then be put on the mailing list.

Machine coding

I WOULD like to know if there are any machine code books for the Dragon 32, which would be suited to an absolute beginner. I am sure many other Dragon users would like to have this information.

R. M. Patel,
Wembley,
Middlesex.

THERE ARE very few books on machine code for absolute beginners. A good general book is *Programming the 6809* by Zaks and Labiak, published by Sybex, priced £12.95. This should be available from good bookshops and computer dealers.

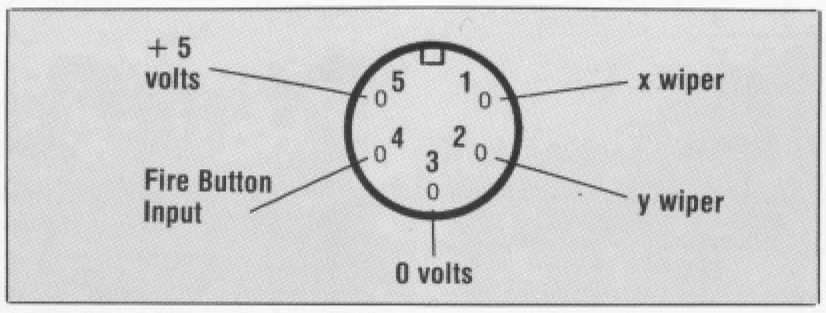
For anyone contemplating learning machine code it is advisable to have an Editor/Assembler such as that provided on cassette by Dragon Data. If you have problems learning machine code I suggest you contact your nearest computer club whose members may be able to advise you.

Joystick wiring

I HAVE heard that it is possible to use Atari and several other joysticks with the Dragon simply by changing the plug. Could you give any advice about this and if possible publish a wiring diagram for the Dragon 32 plug?

J C McGuckin,
Markyate,
Herts.

SHOULD YOU NOT wish to use Dragon joysticks then you may connect other joysticks using a 5 pin DIN plug. The Dragon joysticks contain two 100Ku potentiometers and joysticks of a similar type should be compatible. The connections are as shown in the diagram.



Front view of the socket on the Dragon

Interfaces sought

I WOULD be very grateful if you could give me any information and addresses of where I could get a Dragon interface for controlling other objects using a program, for example for switching lights on and off or controlling a robot. Also, I would like to know if anybody manufactures modems for the Dragon.

G. Page,
Tollesbury,
Essex.

I AM not aware of any company that makes the type of interface you require, or a modem for connecting through to other Dragons.

It should be possible to make your own interface for controlling lights via the printer port. Dragon Data is unable to supply details of the interface circuitry required but can supply the circuit diagram of the Dragon's I/O ports on application.

Should you require a modem for connecting to Prestel, etc, then Micronet 800 will be providing an acoustic coupler as part of its system.

Inhibiting Break key

THE BREAK key on the Dragon is placed very near the horizontal cursor keys and cursor-controlled games often halt because the Break key is touched in error. I have tried testing for the Break key with INKEY$ but it is not fast enough.

Can I POKE somewhere to inhibit the Break key?

Tony O'Brien,
Woodford Green,
Essex.

IT IS possible to disable the Break key with INKEY$ strings but if you use an input statement such as INPUT A$ that will not be disabled. To set up the disable Break you should use the following POKEs strictly in the order given:

```
POKE 411,228
POKE 412,203
POKE 413,4
POKE 414,237
POKE 415,228
```

Then to disable the Break key use: POKE 410,236, or to then enable Break key use: POKE 410,57.

Right Rainbow

THE CORRECT address for Elkan Electronics, which distributes *The Rainbow*, is 11 Bury New Road, Prestwich, Manchester M25 6LZ. Tel: (061) 798 7613.

Send your answers to Competition Corner, *Dragon User*, Hobhouse Court, London WC2 7HF

Digging down to the roots

Gordon Lee tests your skills – Premier provides the prizes.

ASK A FRIEND to write down any large number — one with, say, eight or more digits. Now tell him to mix up the same digits to form a second number, and get him to subtract the smaller number from the larger.

For example: 72104913
14397210
57707703

Now, tell him to cross out any single digit of the answer, except for any zero, and read out to you the remaining digits. So, in the above example, if he crossed out one of the sevens he would read out "five, seven, zero, seven, seven, zero and three". You then instantly tell him the missing digit.

Here's how you do it! As he reads out the digits you mentally add them up. So in this case you would add:

5 + 7 + 0 + 7 + 0 + 3 = 29

As this total is in itself more than one digit, then continue to add together the digits until only a single digit remains. So:

2 + 9 = 11 = 1 + 1 = 2

This is your key digit and to find out the missing number that your friend crossed out simply subtract this key digit from 9. Amazing!

In fact, this trick relies on a very important principle in the field of mathematic puzzles — that of digital roots. The digital root — or DR — of a number is found by repeatedly adding the digits of that number until a single digit remains. Probably the most well known use of the DR is in determining if a large number is exactly divisible by either 3 or 9. Only numbers whose digital root is exactly divisible by 3 are themselves divisible by 3, and similarly, only numbers whose digital root is 9 are exactly divisible by 9.

For example, take the number:
17349872014112876
This has a digital root of 8, so we know that this number is not a multiple of either 3 or 9. We also know that if we were to divide the number above by 9 we would have a remainder of 8, and, similarly, if divided by 3 would give us a remainder of 2 (8 ÷ 3 = 2 plus *2 remainder).*

Similarly all perfect squares have digital roots of either 1, 4, 7 or 9; all triangular number have digital roots of 1, 3, 6 or 9; and perfect numbers (with the exception of 6 — the lowest) are believed to have a digital root of 1. So we can say, without working it out, that the above number is neither 'square', 'triangular' nor 'perfect'.

Note though that a digital root will not prove that a certain number *does* fall into one of these categories, only as in the cases above, that it does not.

No jokers

The principle can be transferred, for example I have in front of me an ordinary pack of playing cards from which I have removed the jokers, picture cards and tens. So I have lett 36 cards, the ace to nine of each of the four suits — hearts, clubs, diamonds and spades. I also have handy a number of plastic counters.

I have shuffled the cards and have dealt out four of them face upwards on to the table. These are a spade, a diamond and two hearts. I then multiply together the *values* of the cards (ace equals 1), and note the product obtained. This counts as one operation and so I put down one counter.

If the product so obtained consists of more than one digit, then I repeat the procedure with this number until only a single digit (or zero) remains. This is rather like finding the digital root except that here we are multiplying rather than adding the digits.

As an example, if my cards were A, 4, 4 and 9 I would write:

1 * 4 * 4 * 9 = 144 = 1 * 4 * 4 = 16 = 1 * 6 = 6

This has taken three operations, so I would also have three counters on the table.

However, with the cards that I have dealt, I find that I end up with *six* counters. If the lowest card is the spade — what cards are on the table?

Prizes

THE PRIZE THIS month is the new Delta 1 disk operating system, donated by its developer Premier Microsystems. The package consists of a controller cartridge and 40-track, single-sided Canon disk drive, along with interconnecting cable and manual. The system provides 100K of storage.

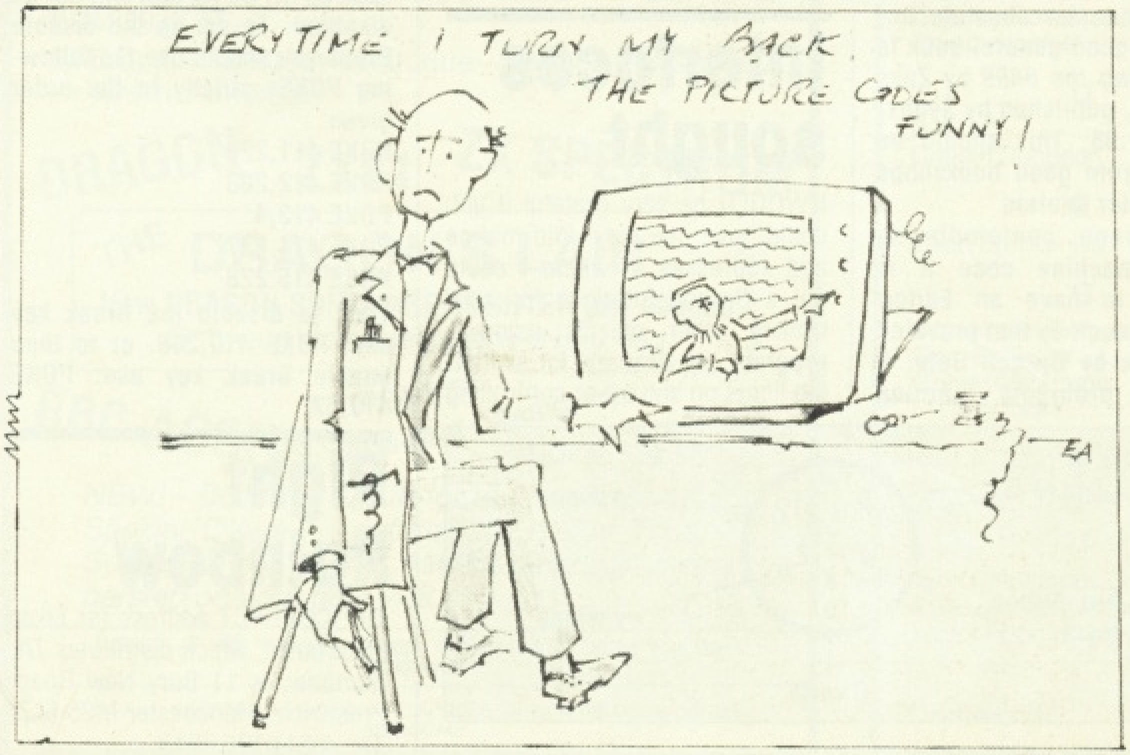
Rules

TO WIN THE disk operating system, you have to send in the most elegant solution to the puzzle. You must show how the competition can be solved with the use of a Basic program, developed on your Dragon 32 computer.

As a tie-breaker, complete the following sentence in 15 words or less:
I want to add a disk operating system to my Dragon in order to ....
....

Your entry must arrive at *Dragon User* by the last working day in June 1983. The name of the winner, and the solution to the puzzle, will be printed in the August issue of *Dragon User.* You may only enter the competition once. Entries will not be acknowledged and we cannot enter into correspondence on the result.

Please send your entries to Competition Corner, Dragon User, Hobhouse Court, London WC2 7HF.





Pirate

(DRAGON 32)

Fast thinking – that's the name of the game!

You are the Captain of a Galleon whose brief is to free the seas from Pirates.
You can manoeuvre north, south, east, or west up to 4 leagues at a time as you roam the oceans. Replenishment of crew members, food etc. can only come from harbours.
Navigate to avoid collisions with Islands or Pirates and don't fall off the edge of the world.
Take care of your stock of guns, cannonballs, sails and men in this action packed high seas adventure with its ingeneous High-Res Graphics.

Please Send:

PIRATE £8.50 ☐

I enclose CHEQUE/P.O. for £......................

Please Debit Access Card No. [| | | | | | | | | | | | | | |]

Name:..

Address:...

....

....Post Code:..........................

ABRASCO LTD. 28, THE FAIRWAY, SOUTH RUISLIP, MIDDLESEX HA4 0RY. TEL.: 01-841 8187

TELEWRITER™

the DRAGON 32 Word Processor

TELEWRITER

Telewriter is the powerful word processor designed specifically for the DRAGON 32 Computer. It can handle almost any serious writing job and is extremely easy to use. It has all the advanced features you need to create, edit, store, format and print any kind of text. With Telewriter you can quickly produce perfect, finished copy for letters, reports, term papers, articles, technical documentation, stories, novels, screenplays, newsletters. It is also a flexible and efficient way to take notes or organize ideas and plans.

51 × 24 DISPLAY

The DRAGON 32 is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required.** By using software alone, Telewriter creates a new character set that has **real lower case letters,** and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the DRAGON 32's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, and beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

. . . truly a state of the art word processor . . . outstanding in every respect

— The RAINBOW, Jan. 1982

The only one with all these features for your DRAGON 32

51 column × 24 line screen display
Sophisticated full-screen editor
Real lower case characters
Powerful text formatter
Works with any printer
Special MX-80 driver
Requires absolutely no hardware modifications
★ Tandy colour version also available

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins, line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in text.

Telewriter will automatically number A4 pages (if you want) and centre lines. It can chain print any number of text files from cassette without user intervention. You can tell it to start a new page anywhere in the text or pause at the bottom of the page.

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with any printer (Tandy, Seikosha, MX-80, Okidata, NEC 8023, C. Itoh 8510, Centronics, GE Terminet, Smith Corona TP-1, etc.). There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

CASSETTE INPUT/OUTPUT

Because the Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retyping a load command when you are lost in your tape. The Verify command checks your cassette save to make sure they're good. You can save all or any part of the text buffer to cassette and you can append pre-existing files from those you have in the buffer already.

ASCII COMPATIBLE

Telewriter turns your DRAGON 32 into the most powerful, lowest cost, word processor in the world today. But that's not all. The simple ASCII conversion program provided with Telewriter means you can use the full power of the Telewriter editor for creating and editing BASIC and assembly language programs. It means you can use Telewriter to prepare or edit text files used with any data communications program.

Telewriter costs £49.95 on cassette and is

AVAILABLE FROM DRAGON 32 DEALERS NATIONWIDE

OR DIRECT FROM

MICRODEAL

41 TRURO ROAD
ST. AUSTELL
CORNWALL
PL25 5JE

24 HOUR ORDERLINE
0726 67676

WE WELCOME ACCESS

AMERICAN EXPRESS

SEND 1stCLASS STAMP FOR OUR FREE SOFTWARE LISTS FOR DRAGON 32 & TANDY RANGE OF COMPUTERS.

PLEASE STATE WHICH COMPUTER YOU OWN

. . . one of the best programs for the Color Computer I have seen . . .

— Color Computer News, Jan. 1982